

The
**HOW
AND
WHY**
Wonder Book of

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30p

PHOTOGRAPHY





THE HOW AND WHY WONDER BOOK OF

PHOTOGRAPHY

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TRANSWORLD PUBLISHERS · LONDON





Introduction

Nowadays we take photography for granted.

We are surrounded by it—in books, magazines, and albums, or as slides, or films in the cinema and on television.

But less than a hundred and fifty years ago if you wanted a picture, you had to draw it, paint it, or engrave it. Most people seldom saw what anything or anybody looked like apart from the things and people they saw with their own eyes within a mile or two of their homes.

Your camera, today, can be simply the little black box you use for taking family snapshots. Or it can be so much more—the key to a fascinating hobby, or even the start of an exciting career as a press photographer or a movie cameraman!

The *How and Why Book of Photography* tells you how your camera was invented, how it works, and some of the many ways in which you can use it.

Originally published in Great Britain by Transworld Publishers Ltd.

PRINTING HISTORY

Transworld Edition published 1974
Copyright © 1974 Transworld Publishers Ltd.
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The *How and Why Wonder Book Series* is originated and published in the U.S.A.
by Grosset and Dunlap, Inc.
Published by Transworld Publishers Ltd., 57/59 Uxbridge Road, Ealing, London W.5.
Printed by Purnell & Sons Ltd., Paulton (Somerset) and London.

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While the alchemists were trying to make gold, they discovered that chloride of silver turned black when it was exposed to light.

How Photography Began

Centuries ago it was discovered that if a very small hole is made in a box painted black on the inside, a picture of the scene outside is formed on the wall of the box facing the hole. It is a very faint picture, and it is upside down.

At about the same time, the alchemists, who were half-scientists, half-magicians, were making experiments

in the hope of turning lead into gold. They did not succeed, naturally, but in the course of their experiments they discovered that a chemical called chloride of silver, which they knew as Luna Cornea, went black if it was exposed to light.

About another three hundred years went by before anybody brought these two discoveries together, and invented photography.

Like most inventions before the present century, it is impossible to say with certainty

Who was the first photographer?

who can claim most credit for photography. As long ago as 1802 an Englishman, Thomas Wedgwood, was showing his friends a neat conjuring trick by making outlines of hands or profiles appear on a sheet of glass coated with chloride or nitrate of silver. What he could *not* do was 'fix' the photographed images, so his outlines rapidly faded.

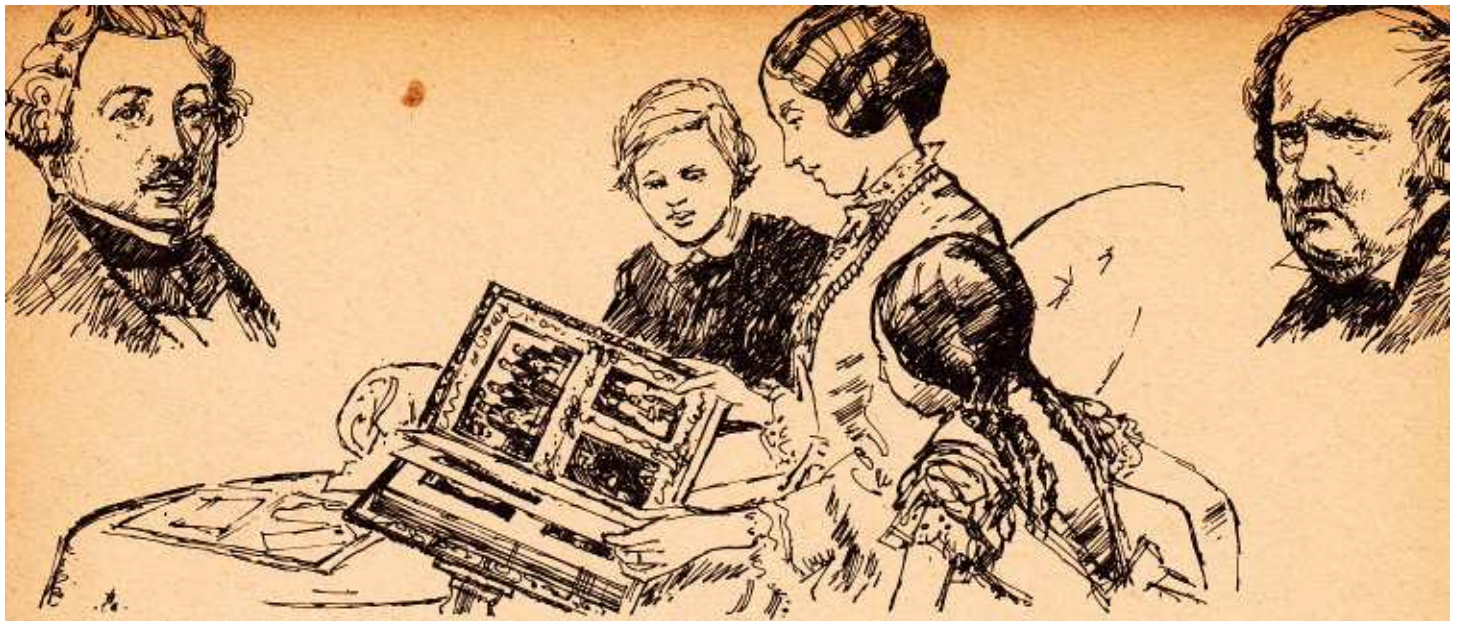
But in 1814—the year before Napoleon's defeat at Waterloo—a Frenchman called Niepce solved this problem. Using a simple black box as his camera, he placed inside it a glass plate coated

with bitumen. Wherever the light acted on it, the bitumen was affected, and the liquids which would normally dissolve it would no longer do so. They dissolved only the unexposed areas—leaving a picture.

In 1824 Niepce and another Frenchman, Daguerre, set to work in partnership, and in England Fox Talbot started experiments. It was the work of these three men, a hundred and fifty years ago, that changed photography from a conjuring trick into a practical method of creating pictures. The Englishman may or may not have been the first to succeed, but he was the first to *claim* success—on January 31st, 1839, just six months before his French rivals.



In 1802, a conjurer was able to make outlines of hands appear on a sheet of glass. It wasn't until 1814 that a stable picture was achieved using a camera obscura (above left).



Talbot (left) and Daguerre's (right) breakthrough in photography made photography a popular hobby amongst the Victorians. Many of them compiled beautiful photograph albums.

Fox Talbot's method of photography, which gave a picture on paper, was called a

What were Calotypes and Daguerreotypes?

Calotype. A Daguerreotype was the Frenchman's method. Daguerreotype pictures, which are on thin sheets of metal, can sometimes still be found in very old family albums.

The earliest photographic camera was simply the old black box, with a few improve-

What were the first practical cameras?

ments. The trouble with the very small hole was that it admitted so little light. It took hours to have any effect on the photographic plate inside. But when inventors tried to admit more light by enlarging the hole, the picture became blurred.

They found the answer was to use a lens, which would admit plenty of light through a much larger hole. By moving the position of the lens, they found they could create clear and sharp pictures on the photographic plate of any object, no matter what was its

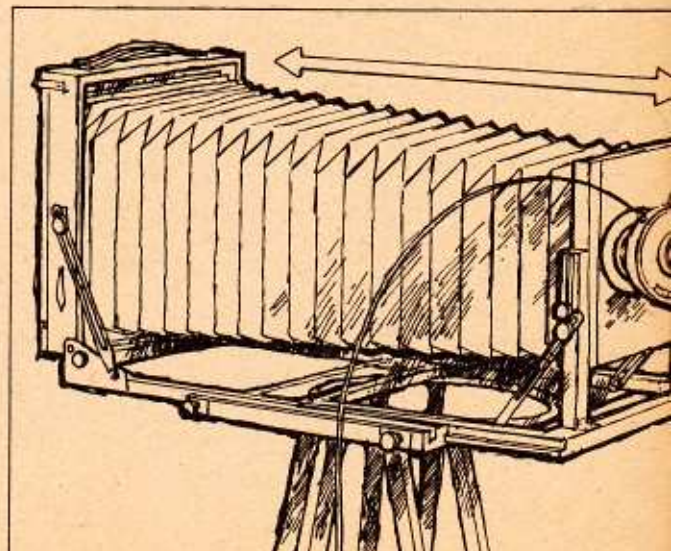
distance from the camera. If the lens was close to the photographic plate, distant objects were clear. By moving it farther away, closer objects were made clear.

At first, taking a photograph was rather complicated. The

Why did early photographers wear black hoods?

back of the old black box now had vertical grooves on each side, into which a ground glass screen was placed. The photographer put the black hood over his head to keep out stray light, and

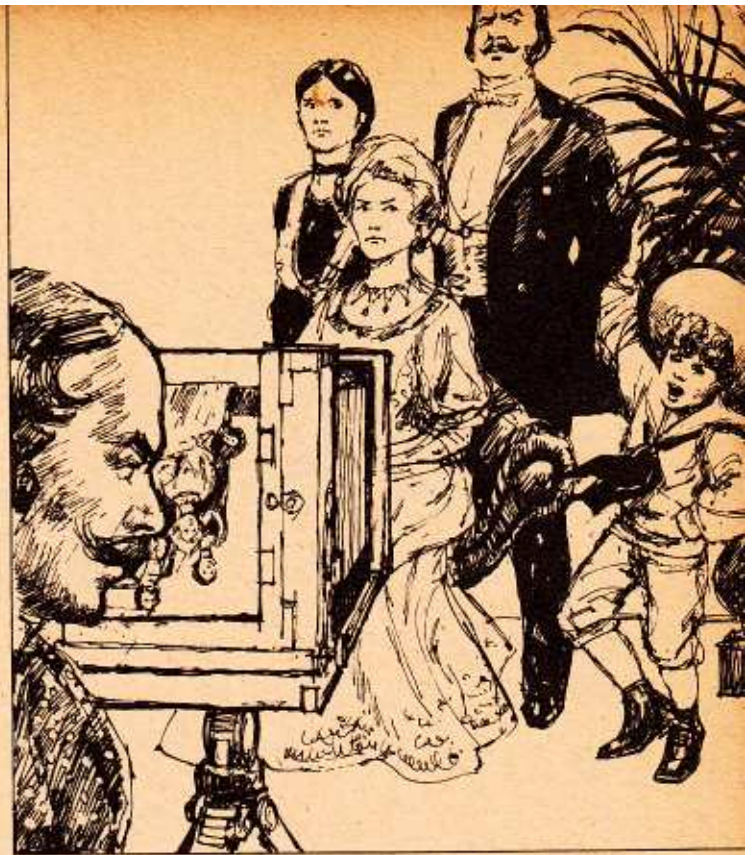
A bellows camera.



looked at this from the back, while he moved the lens backwards and forwards until it gave a sharp image on the ground glass. Then he put a cap over the lens, removed the ground glass, and slid in the photographic plate. He told his subjects to 'Smile, please, and keep *quite* still!' and then uncapped the lens to expose the picture. He recapped it, and slid the plate out again, covered by the black hood. He then hurried into his darkroom, where he kept his developing tank.

With the early cameras, and the **Why do people in very old photographs have fixed smiles?** very slow-acting chemicals on the photographic plates, people posing for a photograph had to stand stock still for several minutes, otherwise the picture would be blurred. That is why there are so few good early pictures of small children. Naturally a baby could not be expected to stay still for very long.

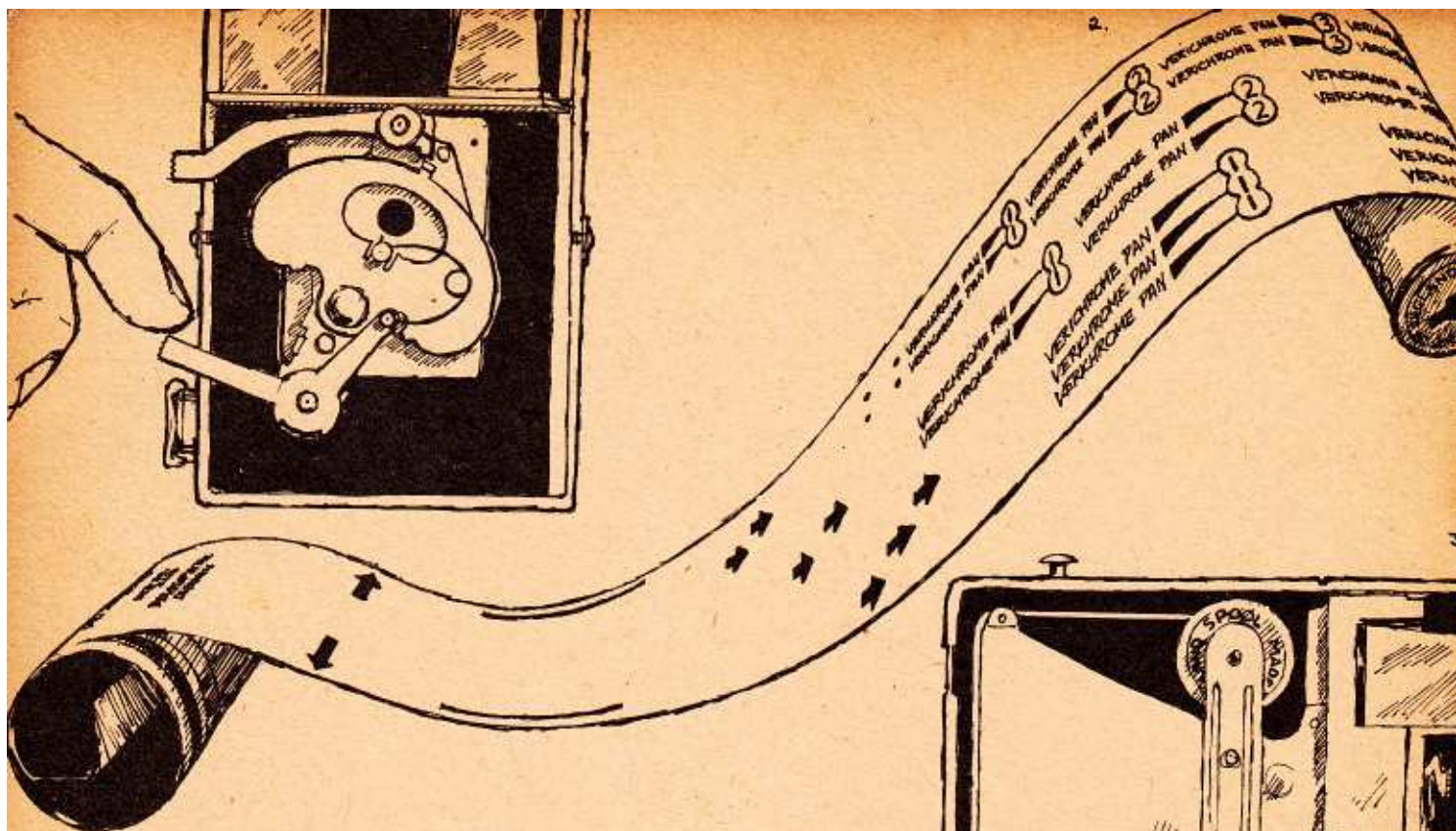
The nineteenth century had more busy inventors than all previous centuries put together. Photography had its fair share of them, and each new discovery led to others. Improved chemical emulsions on the photographic plate reacted more rapidly to light, so the length of the exposure could be reduced. This meant that instead of the photographer uncapping and recapping the lens, a shutter was needed, just like the one on a modern camera. If you take the back



Photographs took so long to take that many didn't come out quite as the photographer had planned!

off a camera, and look into the lens as you press the release button, you will see the shutter open and close again.

Better lenses were made, too. These could be operated with much larger holes, or apertures, without reducing the sharpness of the picture. And about ninety years ago ways were found of making transparent flexible film which could be used instead of glass or metal as a base for coating with chemical emulsion. This made possible the roll films we use today. Instead of each picture having to be developed immediately, a roll film can be kept in the camera for months or even years before being developed. Old films found in attics have been developed successfully as much as twenty or thirty years after they were exposed.



The Way a Modern Camera Works

The simplest camera for the beginner is known as a box camera, because until recently it was, in fact, a square black box. Nowadays its shape and appearance varies, but the methods by which it works have not changed.

Just as in the cameras of Niepce and Daguerre a hundred and fifty years ago, the lens admits light and reproduces an image at the back of the camera. The film is threaded from one roller to another across the back of the camera, and is exposed to the light only when the shutter, in front of the lens, is opened.

What makes the box camera so easy to use is that there is nothing to

adjust. The lens is a very simple one called a meniscus, and it cannot be used successfully except with a small aperture. This limits the amount of light admitted, but the makers ensure that it will be good enough for ordinary outdoor photography in bright conditions, with all objects in sharp focus down to about eight feet from the lens. The shutter is made to open for a fixed length of time.

1) shows the camera shutter mechanism; 2) shows a roll of film with its directions; and 3) shows a roll of film in position in a box camera.

Having an aperture and shutter speed which cannot be changed, there are only two ways in which a camera of this kind can be used to take pictures in poor lighting conditions.

One is by using a film with a faster-acting emulsion. The other is by keeping the shutter open by hand to make what is called a time exposure. Most box cameras have a small lever which can be set either to 'B' or to 'T'. 'B', which is sometimes called Brief Time, means that the shutter will stay open for as long as the release button or trigger is held down. When the lever is set at 'T' for Time Exposure, the shutter opens when the button is pressed, and does not close until it is pressed again. But if you use 'B' or 'T' it means that anybody in your picture will have to copy those early Victorians and stand very still while the shutter is open, to avoid creating a

blur. Both are useless, therefore, for pictures of small children, animals, the sea, and countryside scenes on a windy day.

The viewfinder of a box camera is of two kinds. One is a little glass square, into which you look from above while holding the camera at chest or waist height. The other is a small lens at the back of the camera, which you hold up to your eye. In either case, what you will see is only *roughly* what the camera sees.

The only reason for having a more complicated camera is because you want to take the kind of pictures for which a box camera is no use. A box camera will not:

What extra do you get in an expensive camera?

complicated camera is because you want to take the kind of pictures for which a box camera is no use.

(a) Take pictures which involve movement in poor light.

(b) Take pictures of fast movement, even in bright sunny conditions.

(c) Take close-up pictures.

(d) Take pictures in which the foreground objects are sharp, but the background is in 'soft' focus.

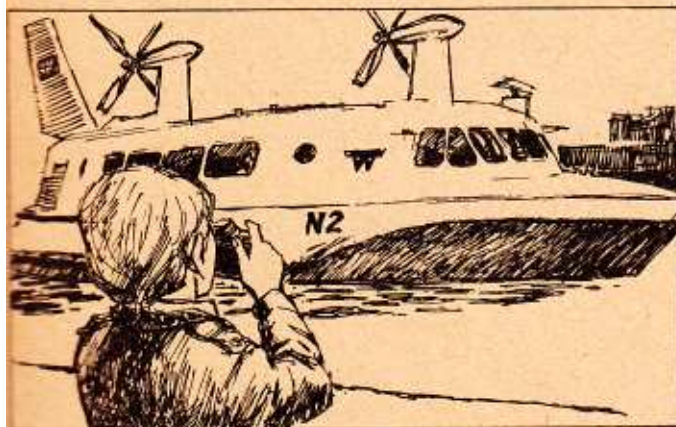
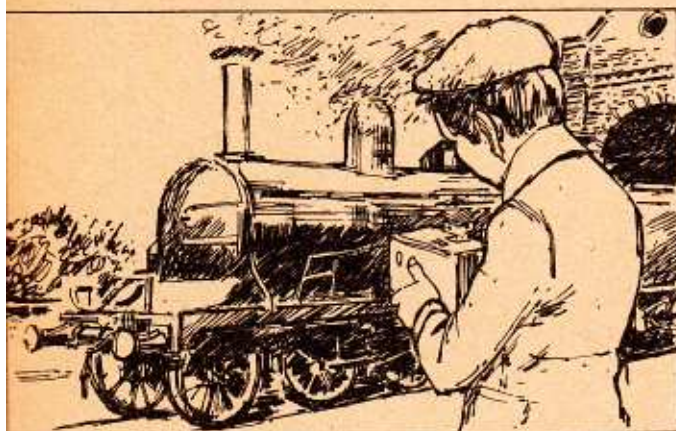
To do these things, an expensive camera has:

(a) A lens which can be focused by moving it nearer to or farther from the film.

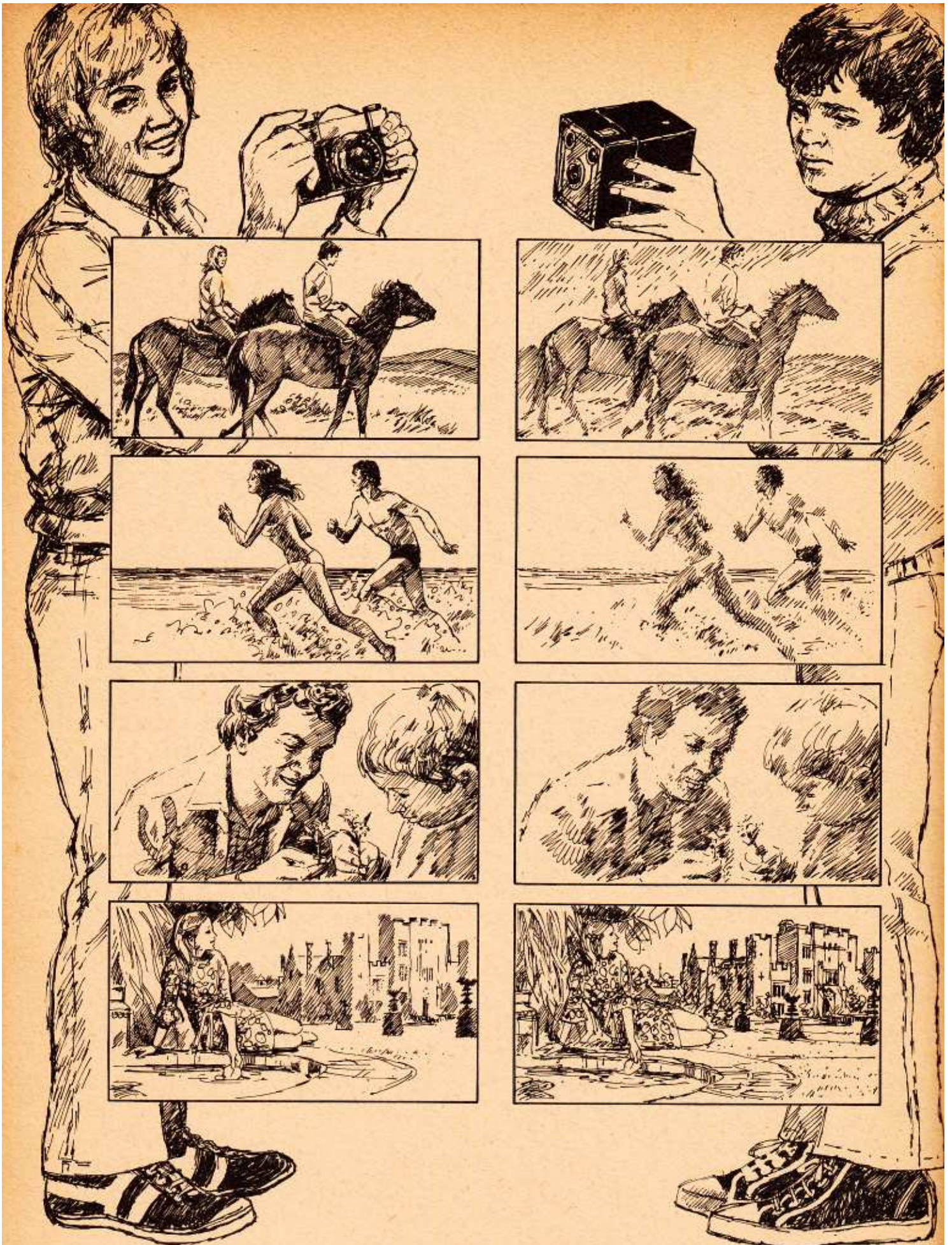
(b) A lens which can be used with a wide aperture.

(c) A shutter which can be operated at a wide range of different speeds.

(d) A viewfinder which shows *exactly* what the lens is seeing, and reveals whether the picture is in focus.



Although box cameras have changed a lot in appearance from when they were first made, they still have to be held very steady when moving objects are being photographed.



The photographs on the left were taken with a focusing camera, and those on the right with a box camera. The focusing camera achieves much clearer prints.



'Telephoto' lenses are ideal for spies!

Some cameras have lenses which can be unscrewed and changed over to suit particular photographs.

What special lenses can be fitted to a camera?

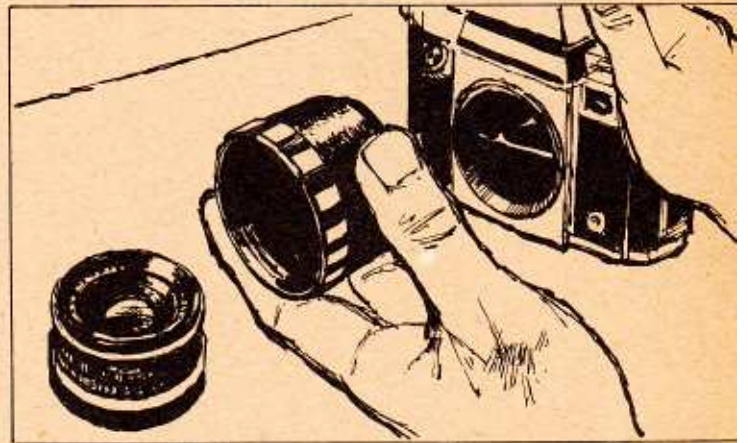
'Telephoto' lenses work like a telescope; they make it possible to take close-up pictures from a long distance away. They are ideal for spies who want to take pictures of the enemy's secret weapon but dare not come close—but also ideal for such simpler problems as taking a close-up picture from the shore of somebody sitting on a raft a hundred yards out to sea.

A 'wide-angle' lens does just the opposite. As its name suggests, it will give a wide picture at short range, which is very useful if you have to take pictures in a small room.

If a camera's lens can be unscrewed, it can then have an extension tube put in place between the lens and the camera. This

What are extension tubes?

will make it possible to bring into focus objects closer than the limit marked on the lens mount. Some cameras are provided with a set of three extension tubes, each of different length. Used singly or in combination these make possible a wide range of ultra close-up work.



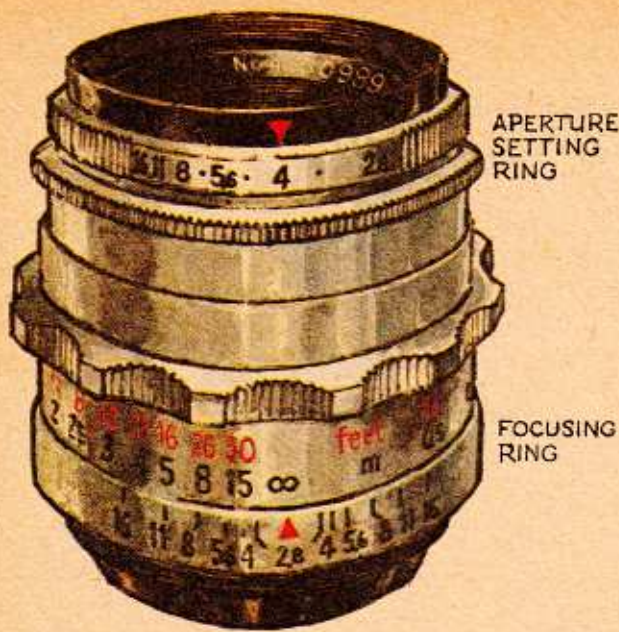
An extension tube can be added between the camera and the lens to improve close-up work.

In deciding what is the best camera for you, what matters most is knowing how you want to use it.

Is it worth while to pay a lot of money for a camera?

If it is to be for holiday and garden snapshots, and nothing else, then a simple box camera is all that you will need. There are three kinds, each made to take a particular design of film.

(a) A 'roll-film' camera. This has a film backed by paper, which is wound from one spool to another, each picture area in turn being indicated by a number in a small window in the back of the camera. This kind is best suited for taking prints for framing or putting in an album, and also the best if you



A simple focusing lens.

want to develop and print your pictures at home without the expense of buying an enlarger.

(b) An 'Instamatic' camera. This has a film cartridge which fits into the back of the camera. It is the easiest to load and unload, and is suitable both for taking prints, or transparent slides for showing by means of a projector.

(c) A '35mm' camera. This uses a roll of film not backed by paper, and wound from a cassette on to a spindle, each picture area being indicated on a dial at the top of the spindle. After use, the film is wound back into the cassette. It is suitable for prints or for slides, and the films, which have 20 or 36 exposures on them, cost rather less per picture than the other two.

The most popular of the three is the Instamatic, because of its simplicity, and the camera is the most compact—which is important if it has to be carried about all day while on holiday.

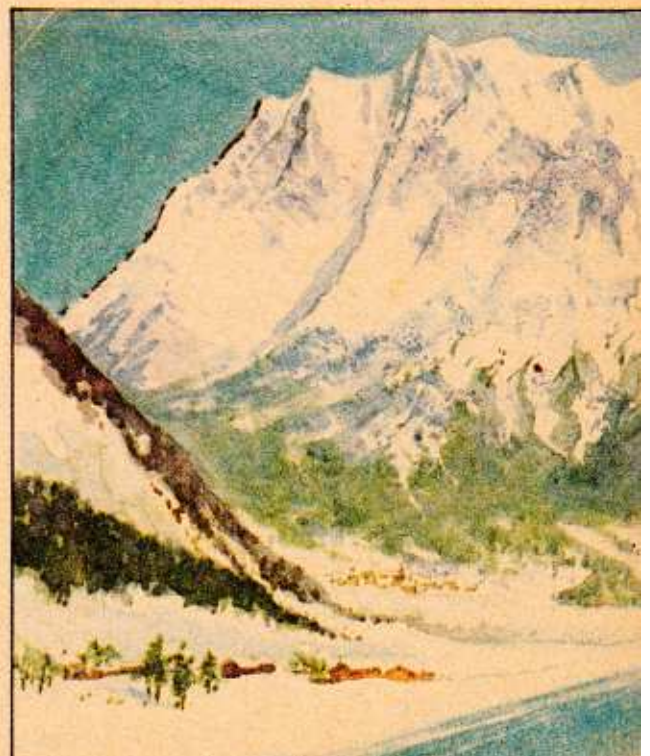
A polaroid camera is one designed to give you a photographic print, fully processed,

only a few seconds after you have taken the picture. For certain purposes it is more useful than an ordinary camera—at parties, for example, when it is a pleasant surprise to give people pictures of what has been going on, which they can take away with them when they leave.

The quality of the pictures is good, but they are a good deal more expensive than prints made by the usual methods.

The simplest kind of focusing is that on old-fashioned 'bellows' cameras,

many of which are still in use, giving good results. The lens can be moved towards or away from the film by sliding the whole front of the camera along



parallel rails, which have indicating marks at intervals to show the distance for which the lens has been focused.

More advanced lenses on modern cameras do not have to be moved so much, and can be set by turning them in a screw-mount on the front of the camera. The barrel of the lens is marked to indicate focusing distances up to infinity (usually marked by an ∞ or 8 turned sideways). With the lens set at this mark, a scale shows that everything will be in focus from as far as the lens can see, down to a short distance which varies according to which aperture is in use.

When focus is set at shorter distances, the depth within which everything will be in focus becomes very much reduced.

Remember from earlier on that the larger the aperture, the greater the light reaching

What are 'f' numbers?

the light reaching

the film. The aperture is controlled by a ring of overlapping thin sheets of metal, operated by moving a ring, wheel, or lever on the barrel of the lens. The way the aperture changes can be seen by looking into the front of the lens. 'f' numbers are the various sizes of aperture available. The average camera has f2.8, f4, f5.6, f8, f11, and f16. The higher the number, the smaller the aperture. f11 is twice as large as f16, f8 twice as large as f11, and so on. Cameras with very expensive lenses may 'open up' even beyond f2.8—to f2, or f1.4.

The exposure—the amount of light reaching the film

How is shutter speed controlled?

—depends not only on the aperture but,

as was made clear earlier, also on the length of time the shutter is open. In the box camera there is only

From left to right - normal aperture is used for taking a picture in a wide open landscape; one stop greater is used for pictures of buildings; and two stops greater are used for people in close-up.



a fixed time, plus 'B' and 'T', but more complicated cameras have shutter speeds from 1 second down to as little as $\frac{1}{300}$ th of a second, or even less. These are marked on a control ring or lever, usually on the top of a modern camera.

The amount of light reaching the film is controlled by a combination of aperture and shutter speed—the greater the aperture, the shorter the exposure needed.

In choosing the combination of aperture and shutter speed for any particular picture, the *kind*

How do you decide about apertures and shutter speeds?

of picture helps you to reach the right balance. If there is movement, the shutter speed must be kept high, to avoid the risk of blurring. This will mean using a wide aperture to compensate, and as a result, the focusing will have to be accurate. If there is no movement, then the shutter speed can be low, and the aperture need only be small, providing clear focus from infinity right up to a few feet from the camera.

The leaflet inside the film box tells you what the makers recommend as the

How do you judge the light?

right exposure for various amounts of light, ranging from dull weather to bright sunshine. Most modern film has what is called a wide exposure latitude, which means in effect that you can make a slight misjudgment of the light,

and still not ruin your picture. Unless you have money to burn, and can afford an exposure meter, which does the calculating for you, it is sensible to learn the trick of judging the light.

The speed of the chemical emulsion with which a film is coated is given in numbers, followed by the letters ASA. A typical colour slide film for normal use is 64 ASA, and the makers' leaflet gives a list of suggested lens apertures for various conditions, with the shutter set at $\frac{1}{100}$ th of a second, or $\frac{1}{125}$ th. These are:

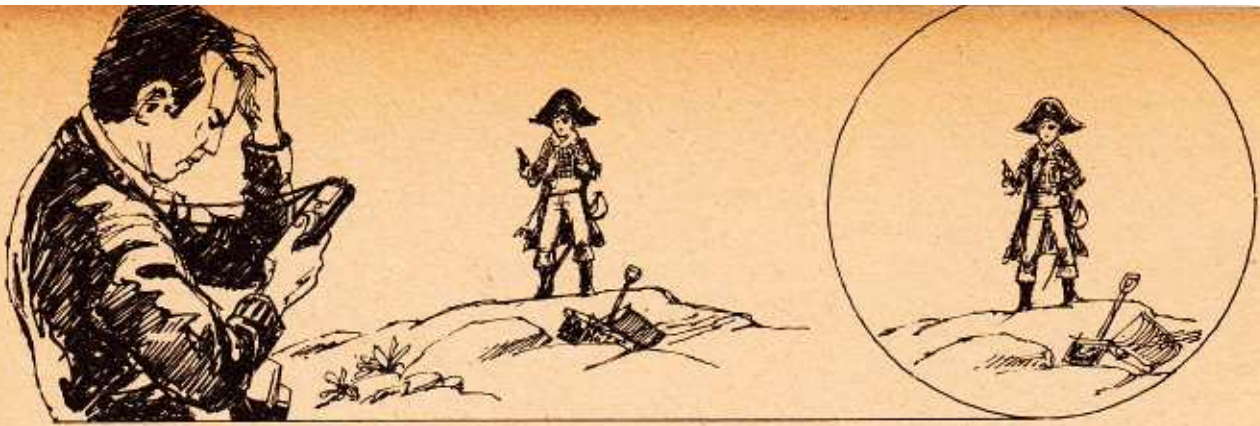
1. Bright sun, with distinct shadows—f16
2. Hazy sun, with soft shadows—f11
3. Cloudy, with no shadows—f8
4. Dull, and heavily overcast—f5.6

Those are the apertures they suggest if you are taking pictures on the beach, in the snow, or in a wide open landscape. All the apertures should be *one stop greater* for pictures of buildings, people in the distance, and landscapes with anything of importance in the foreground, and *two stops greater* for people in close-up.

An exposure meter measures the strength of light

How is an exposure meter used?

on the subject you want to photograph. A needle registers the strength, shown against scales which will tell you what combinations of aperture and shutter speeds are suitable for the conditions. These scales are adjusted to suit the kind of film being used.



When your subject is against a pale sky, your exposure meter will give a false reading. You will need to get close to your subject to get a correct reading.

But exposure meters can be misleading. If you used one to judge the correct exposure for a person standing against a clear light blue sky, the 'eye' of the meter would see much more sky than person, and would therefore give you a false reading, one that would tell you to use a much shorter exposure than you really want for correct shades of hands, faces, and most colours of clothing. To overcome this, you have to take the exposure meter much closer to the person than your camera position, so that you can be sure that the 'eye' is looking at the person and not at the sky.

The important thing about judging distances is that you do not have to do it very

How do you judge distances?

accurately in most cases, providing you work with the lens set at small apertures—f8 and under. Only when you are working at f5.6, f4, and greater apertures does focusing become critical.

It is at distances of ten feet and less that the difficulty lies. Photographs which can be set up in advance—a picture of a fountain, or a flowerbed, for example—can even have their distance measured accurately, but most pictures have to be taken immediately or not at all.

An easy way of making a rough check on distance is to use an adult as a ruler! Adults are normally 5½ to 6 feet in height. Look at one, and imagine him or her lying on the ground. An object one and a half adults away is about nine feet from the camera. It is also useful to measure the length of



Different ways of steadying a camera.

one of your shoes. Knowing this, you can tread the distance between the object and the camera—or, if you know that so many shoe lengths is ten feet, simply start treading from the object towards the sun, turn after ten feet, and take the picture.

Expensive cameras have rangefinders to do all this. But rangefinders, exposure meters, and all the other features which put pounds on the price of a camera are really only expensive substitutes for common sense!

The longer the exposure, the more you need a tripod.

What is a tripod for? Try an experiment to prove this. Hold up the camera as if taking a photograph, and judge for yourself how steady it is. You will find it is constantly very slightly on the

move, because of the unsteadiness of your hands, and the expansion and contraction of your body as you breathe. This does not matter for pictures taken with a short exposure, but would ruin the picture if the shutter was open for more than about $\frac{1}{30}$ th of a second.

But a tripod is heavy and awkward to carry about. There are other ways of steadying a camera, such as standing it on a wall, on the bonnet of a car, or the back of a seat.

Most cameras are strongly made, as a protection against unavoidable accidents.

What care does a camera need?

But they cannot be expected to stand up to the shock of being dropped. Make sure, therefore, that the carrying

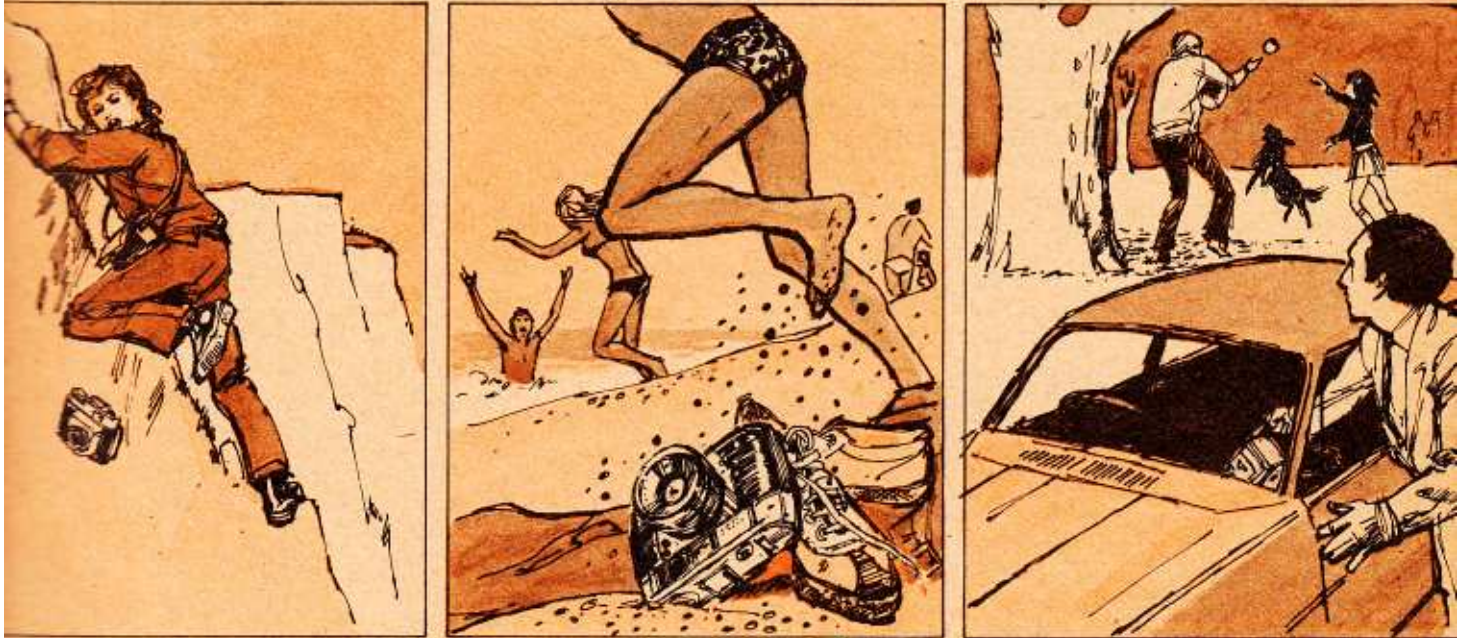
strap is secure, and that the camera is properly fastened into its case.

Heat and damp can damage the mechanism. When it is not in use, keep your camera in a well-ventilated room. Out of doors, do not leave it for hours on end in the full glare of the sun.

Dust, and particularly sand, are a menace. If you have to keep your camera on the beach all day, wrap it up, and put it into a polythene bag with a rubber band round the top—but if possible, bring it to the beach only

when you are about to take pictures, and take it away again straight afterwards.

If your camera has a lens cap, keep it on whenever it is not in use. If the lens gets dusty, use a soft brush, *not* a piece of rag or a handkerchief, to clean it. Special lens cleaning cloths are included in many camera kits; these can be used to remove dirty smears on the glass, but the work must be carried out very carefully, to avoid scratching the surface.



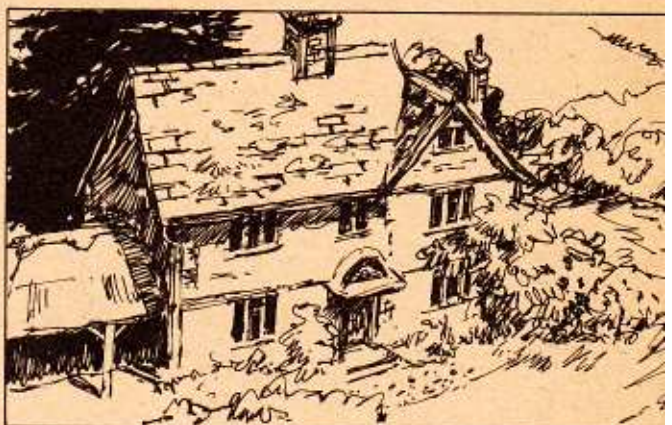
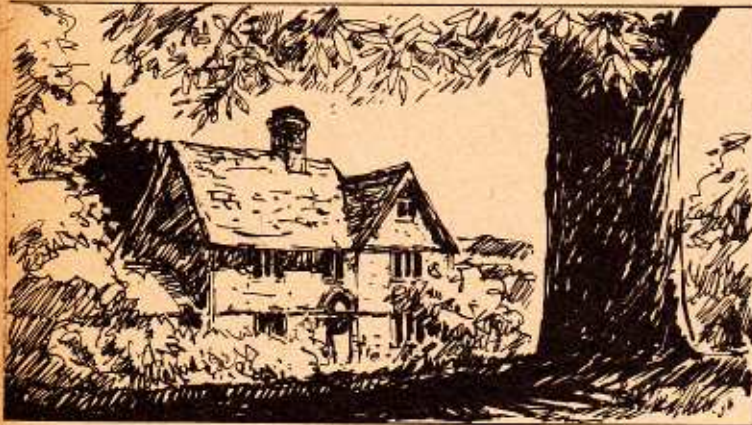
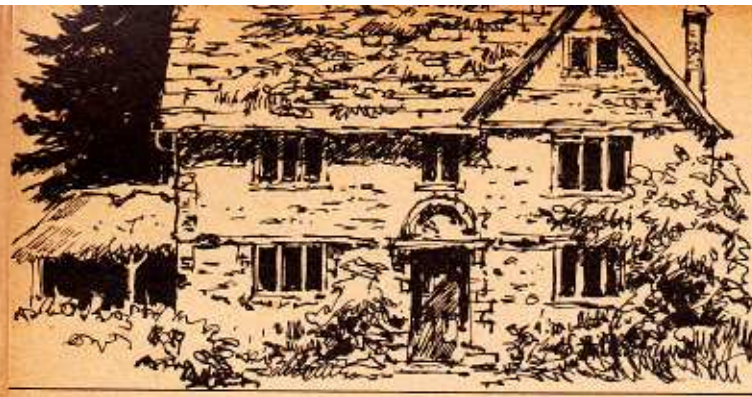
Your camera can be harmed in many ways. These are just a few.

Don't take chances—your camera is valuable. Put your name and address inside the camera case, so that if you lose it the finder will know where to send it.

How can you keep your camera safe?

Cameras are easily stolen, and easily disposed of. Do not put your camera down in public and wander away, and

do not leave it where it can be seen inside a parked car. If the camera is numbered, make a note of the number in your diary, so that if it is stolen you can give the number to the police. Unless you do this, even if they find it you could have difficulty proving it is yours.



The same scene viewed from different angles and distances.

Taking Pictures

Neither is 'best'—each has its own particular uses.

Which is best — colour, or black and white?

Black and white is usually chosen for pictures

which are to be made into prints. Colour prints are much more expensive, and so most people use colour mainly for slides which are projected on to a screen.

But the choice is not simply one of cost. A picture of people having tea in the garden will obviously be more interesting and attractive in colour. On the other hand a photograph designed to show—for example—the way a golfer holds his club, or a footballer bluffs his opponent, will probably do its job much better in black and white.

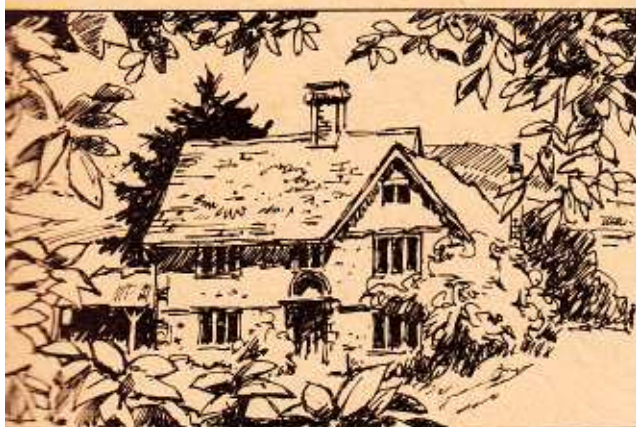
At the cinema you may have noticed that many detective films are still 'shot' in black and white because they are more exciting and dramatic that way than if colour film were used.

Some pictures have to be 'composed'; in others the

How do you 'arrange' a picture?

composition cannot be changed,

only the way in which the camera views it. For example, the family on the beach can be grouped to suit your ideas, and you can 'arrange' them to do anything you like, from playing with a beachball to dozing in deck-chairs. But a landscape or a building are fixed; the 'arranging' has to be done by the photographer in his choice



of camera position. He can go close, so that the main feature fills most of the picture, or he can move away, so that the main feature is seen in relation to the things around it. For instance, a sailing dinghy filling the whole picture reveals much less than a more distant shot showing that it is leading by only a few yards from six other dinghies at the finish of a race.

The main feature does not have to be in the centre of the picture. And the relationship between distant and foreground objects will be altered by moving to your left or right. To gain experience in finding camera positions, go to an old village and try to take a photograph which could have been taken a hundred years ago! To do that you have to find a position which cuts out of the picture all modern houses, television aerials, motor traffic, bus stops, and white lines down the middle

of the road. To succeed, you may have to lean out of a window or climb a tree—but there is nearly always a way.

Some of the best portraits are not posed at all—they are pictures taken when the person

How do you take a portrait?

is too busy to be aware that a camera is being used. But these are lucky chances; most portraits involve careful thought and composition. It is best to have the person's head slightly above the centre of the picture, and as the face is the most important thing in a portrait, try to have the background in soft focus. When the aperture is increased, focusing distances have to be worked out with greater accuracy. With the aperture opened to f3.5 or even more, and the subject sitting only a few feet away, focusing will have to be done with a tape-measure except with expensive cameras which can be focused through the viewfinder. This accuracy of focusing means that everything nearer or farther away than the subject will be in soft focus.



Portraits are seldom taken with the subject facing the camera, or in full profile. The best results are usually gained by viewing the subject from some angle between the two, and telling him to look at something to one side of the camera.

Many inexpensive cameras have attachments for taking pictures in poor light with a flash bulb.

How is a 'flash' camera used?

There are also more expensive units called electronic flash—but these are designed for people who intend to take a great number of flash pictures.

Each flash bulb can be used once only, and this means it roughly doubles the cost of taking the picture, so the obvious rule is not to use flash unless it is necessary. When you do, you will find that the camera has a special setting to operate the flash and provide the correct shutter speed.

Unlike natural light, flash provides plenty of light close to the camera, rapidly decreasing with distance. To work out the aperture, look at the table printed on the flash bulb packet. It will provide a guide number to suit the speed of the film. Divide this guide number by the distance in feet between the camera and the subject, and the

figure you get will be the f number of the aperture you need. If the picture is being taken in a room with very dark walls or a great deal of dark furniture, open up one extra f stop to compensate for this.

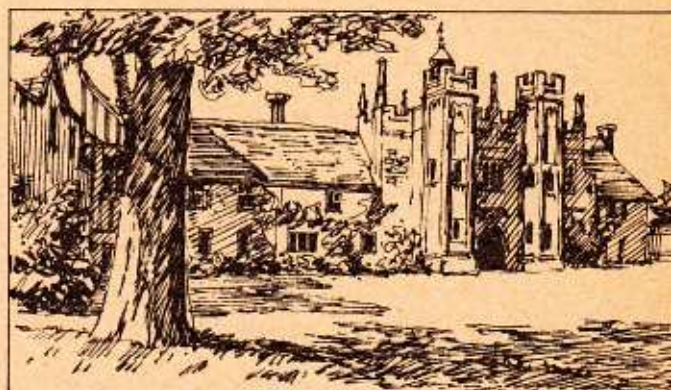
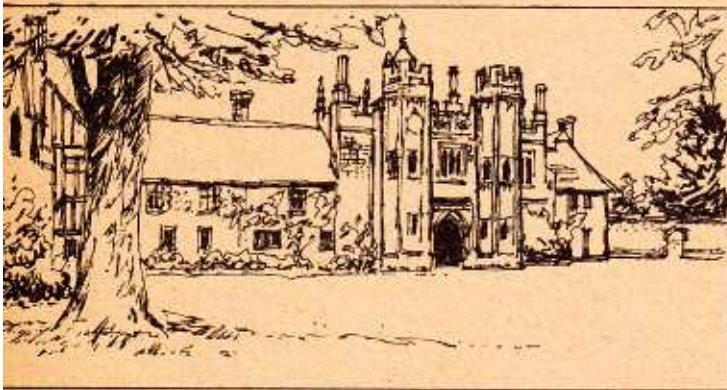
There are two kinds of flash bulbs on sale—plain and blue. Plain are suitable only for black and white pictures, but blue will work equally well with black and white or colour.

Any camera you are likely to buy or be given now-

Can an ordinary camera take colour pictures?

adays is just as suitable for colour pictures as for black and white. And though you might expect colour pictures to cost more, in most cases they are as cheap as in black and white. By the time you have bought a black and white film, then paid for it to be developed, and for

Top—using black and white film, the same view shown twice. Left with the sun high in the sky; and right, with it low in the sky so there are long—but not particularly dark—shadows. Bottom—the two views if colour film were used. The left picture is changed, but in the right picture, the shadows have become almost black and dominate the photograph.





The best way to keep your slides is in a slide box. This prevents the slides getting scratched and marked.

prints to be made, the total you have spent will be about the same as the price of a colour transparency film, for which you pay the processing costs when you buy the film. A transparency film does not provide you with prints, but with slides for projecting on to a screen.

Where colour becomes expensive is if you want prints to put in an album. These cost far more than similar prints made from black and white film.

Reversal films are the kind used for making slides.

What is 'reversal' film?

Instead of the picture being taken as a negative, from which a positive print is made, the original film becomes the slide, by reversing the image from negative to positive during the processing.

Colour films are usually 'slower' than black and white —meaning that a greater exposure is needed. Also the exposure

needs to be judged more accurately to get good results. Just as with a black and white film, the leaflet enclosed when you buy it tells you what the makers suggest as the correct exposure for its speed in various lighting conditions.

Sunshine is more important in colour photography than in taking black and white pictures. Without sunshine, the colours are very often drab and lifeless. Colour film manufacturers also suggest that the best colour pictures are those taken when the sun is high in the sky; this may be true if accuracy of colour is the only important thing,

but in fact pictures taken in the early morning or late evening, though not giving correct colour, often give very attractive results. But avoid contrasts of bright sunlight and deep shadow, for if the well-lit parts of the picture are correctly exposed, the shadowed areas will probably turn out almost black.

Because there is considerable difference

Can colour films be used with artificial lighting?

between natural and artificial light, different films are used.

For pictures taken in artificial lighting, use the film specially sold for this purpose; in daylight, use daylight film, or artificial light film with its colour corrected by means of a filter placed over the lens of your camera.

As it is not always possible to forecast in advance whether all the pictures on a particular film will be taken in the same conditions, some modern cameras are designed for artificial light films, and have a built-in filter which is moved into position for pictures in daylight. If your camera is not built this way, and you want to be able to take pictures in both daylight and artificial light without changing films, ask your photographic shop to supply you with the correct filter to fit over your lens.

Prints can nowadays be made from

Can prints be made from colour slides?

colour slides, which means that when buying

a film you do not have to make up

your mind in advance whether to buy colour reversal for slides, or colour negative for prints. It also means that you can keep down costs, by merely picking the very best of your slide pictures for duplicating as prints for your album.

Both slides and negatives are easily

How are slides and negatives stored?

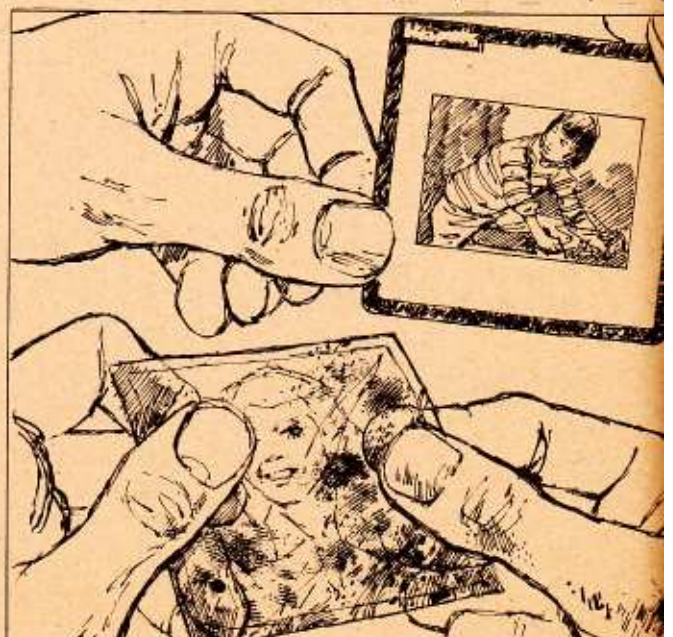
scratched, and fingerprints also show up on

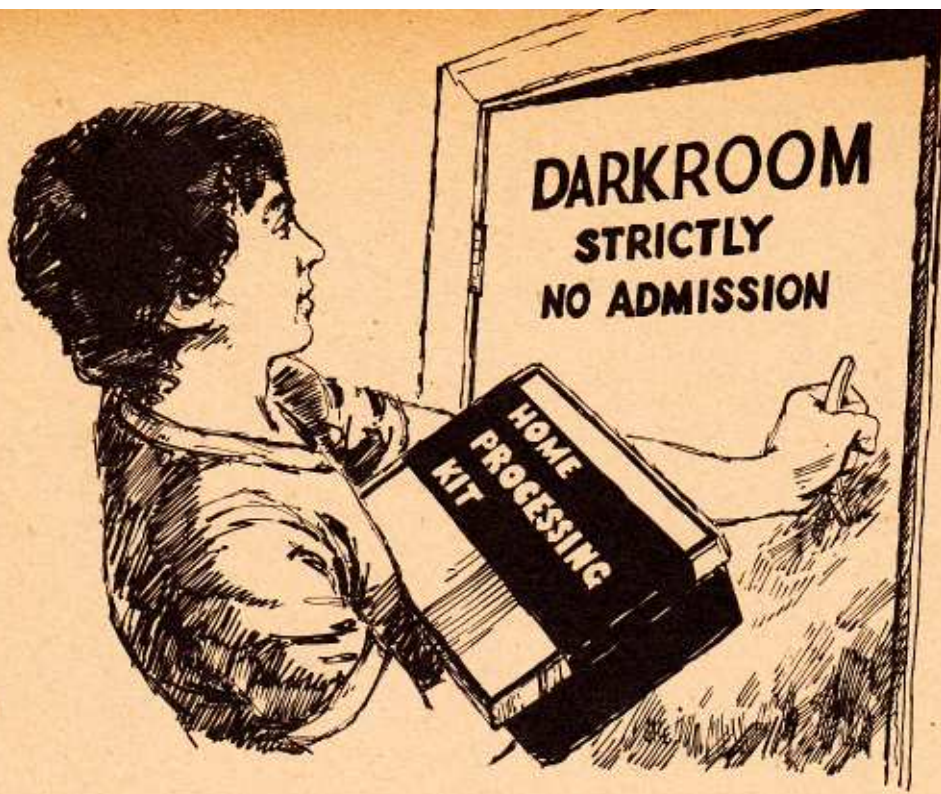
them. Slides should always be handled by the card or plastic mount, and negatives picked up by the edges.

The best way to store slides is in a box with numbered slots. Special slide boxes of this kind are not expensive, and usually inside the lid there is a list of numbers, with spaces for writing brief descriptions of each picture, so that any particular slide in the box can be traced immediately.

Because negatives have sharp edges after they have been cut from the roll of film, any you want to keep for extra prints in the future should be kept in separate envelopes to avoid the risk of scratches.

If you don't want your slides looking sticky, always hold them by the edges.





Home processing can be fun—but make sure that all the conditions are right if you want good results.

Processing

Developing and printing your own films at home is a good idea *if* you can use an attic or somewhere similar as a really effective darkroom, and *if* you are neat with your hands. A neat worker in a good darkroom can produce results as good as those of a processing laboratory at much less cost. But careless work in poor conditions produces bad pictures or no pictures at all.

Is home processing worth while?

There must be not a trace of light in a photographer's darkroom. Even a faint gleam of daylight under a door will ruin a modern film designed to react to an exposure of $\frac{1}{500}$ th of a second or even less.

How dark must a darkroom be?

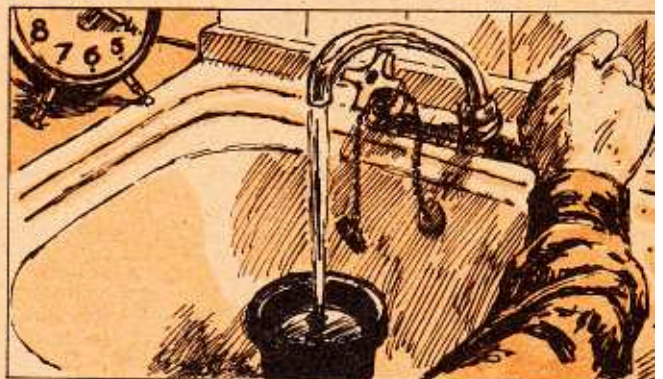
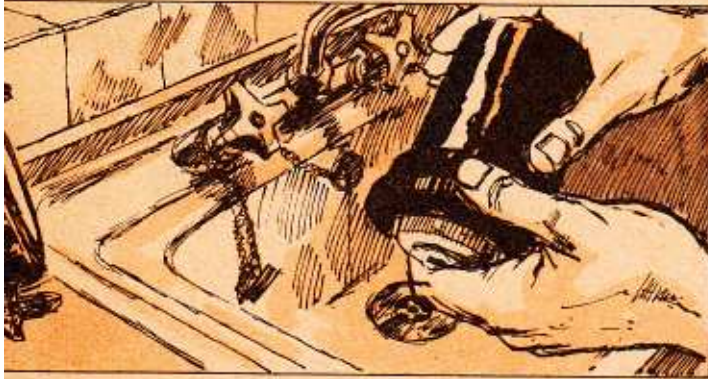
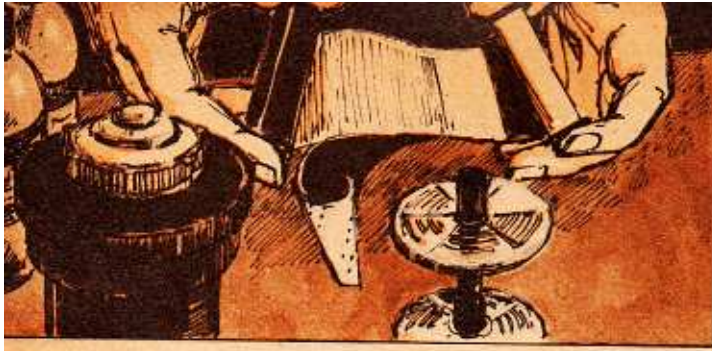
If you have to use a bedroom as a darkroom, do the work at night time only, and put blankets over the windows to shut out any trace of moonlight, lamp light, or the beams of car headlamps. Drape a blanket over the doorframe, and either lock the door or warn the rest of the household not to come in.

Chemists and photographic shops sell complete kits for developing film.

How is a film developed?

The instructions with these vary slightly, but the method of work is always basically the same.

The first stage, carried out in complete darkness, is to remove the film from its spool or cassette, and put



The drawings above show some of the stages in developing a film. Although the kits may vary slightly, the basic method is still the same.

it into the developing tank, strictly according to the instructions given with that particular tank.

Next the lid is put on the tank. The light can now be switched on. About two quarts of water (just over two litres) will be needed, and 'wetting agent', also developer, 'stop bath', and 'fixer', all of which should be at the temperature suggested in the kit instructions. In most cases this is 68° Fahrenheit, or 20° Centigrade.

A small quantity of wetting agent is added to the water, and the tank is filled with water which is then stirred or agitated for half a minute. The water is poured out, and the developing solution poured in. This is left, and agitated at intervals, for the length of time recommended in the instructions, and then drained off.

Next the 'stop bath' is poured in—to halt any further development. This will need about half a minute to act, then

it, in turn, is removed, and the 'fixer' poured in to remove all unexposed emulsion so that the film can afterwards be brought out into the light without any further alteration taking place. There are slow and high-speed fixers; the time they take varies from two to ten minutes.

After removing the fixer, pour in some of the remaining water—then take the tank to a sink or bathroom basin and let cold water run into it for half an hour.

When the half hour is up, empty the tank, and refill it with the last of the original water, agitate it, and allow it to stand for 30 seconds.

Now the developing is complete, and the film can be taken out of the tank. A clothes peg or rustproof metal clip is put on the end of the film, and it is hung up to dry.

All this may seem very complicated, but once you have tried it, it quickly



becomes a straightforward routine. And there are now one or two kits available which make the whole process easier, by combining the developing and fixing in one stage.

Prints are easy to make if the negatives

Are 'home prints' easy to make?

are large enough for the prints to be the same size.

Otherwise it is necessary to buy an enlarger, which is expensive. This is the reason why a roll film camera, with large negatives, is the best for people who want to experiment with home processing.

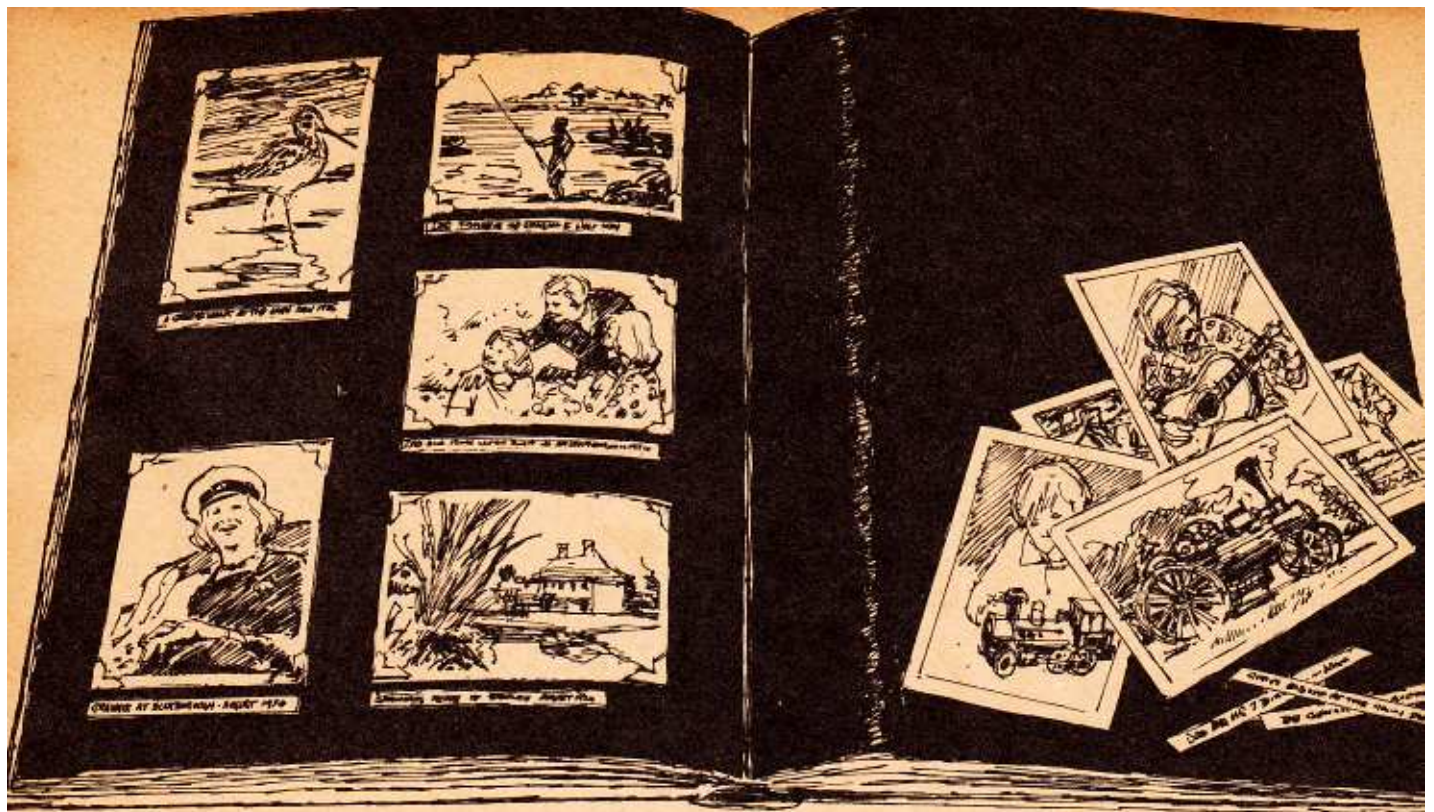
Prints of the same size as the negatives are made by 'contact printing'. The printing is done in the darkroom, using a contact frame which holds the negative against the contact paper under a sheet of glass while they are exposed to the light of an ordinary household electric bulb. Except during

the exposure, the only light which can be used safely is from a bulb called a 'yellow safelight'.

The print is then developed, using a method rather similar to that of developing a negative. Four shallow dishes are needed—these can be bought quite cheaply at a photographic shop, and shops which sell kitchen plastic goods sell them even more cheaply. The dishes are used for developer, 'stop bath', 'fixer' and plain water, all at about 68° Fahrenheit (20° Centigrade).

As soon as the contact paper is removed from the frame, put it face downwards into the developer (working, of course, with only the yellow safelight). After about fifteen or twenty seconds, turn it over, and rock the dish to agitate the developer across the face of the print. When the image forms, lift out the print, drain off the developer from its surface, and put it into the stop bath for about twenty seconds. Drain it once more, and place it face downwards in the fixer for ten to fifteen minutes. Then put the print into the dish of water, where it can lie until any other prints have been completed. Finally all the prints are washed for half an hour under running water, and are ready for drying.

Glazed prints are best dried by laying them face downwards on a sheet of clean glass. Unglazed prints are shaken to remove surplus water, then laid face upwards on blotting paper or newspaper to dry. If they show a tendency to curl, they can be flattened between the pages of a book.



A well-thought-out page in your album shows your photographs off more effectively.

Showing Your Pictures

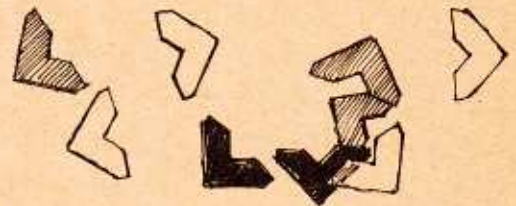
Never glue prints to an album page—

How are prints set in an album?

one day you may want to move them to another

page or even another album. Photographic shops sell several different kinds of mounts for fitting on the corners of prints; the mounts are glued to the pages, but the prints can be slid in and out of them.

Titling the prints can be done directly on to the album page if your lettering is neat enough. Otherwise, write them on plain paper, then cut them out and glue them to the page only when you are satisfied that they are neat enough. Typewritten titles, made in the same way, have the big advantage that unlike handwriting, their style does not change over the



years. The best titles make it clear even to a stranger what the photograph is about. 'GRANNIE AT THE SEA' does not tell anybody very much, but 'GRANNIE AT SCARBOROUGH, AUGUST 1974' tells quite a lot.

The range of albums on sale is enormous, and so is

What kind of album is best for your prints?

the variation in prices. Choose the album that suits the *amount* of photography you expect to do, and also the *kind* of photography.

If yours is going to be no more than a holiday camera, for taking a few pictures of the family and friends every year, then a small and inexpensive album is all you will need. It will fill up only slowly, and will not be opened very often, so the paper and binding do not need to be particularly strong. But if photography is likely to become a serious hobby, you will want an album strong enough to stand up to constant handling, one which has a loose-leaf binder so that more pages can be added when necessary. Buy only a make of album which your photographic shop recommends. Cheap albums by unknown makers are no bargain if later on you find you can no longer buy extra leaves!

Many albums have a sheet of strong tissue between each page. This is an extra expense, but it protects the pictures from catching against each other when the pages are turned.

Wooden or plastic frames are not very expensive, and these can therefore be used for your very best pictures. For those which are not quite so important, small squares of glass can be given frames of passe-partout—a kind of sticky paper tape sold in rolls.

Bought frames include cardboard mounts. You can buy cardboard mounts separately, or make your own. Using a ruler and a knife with a very sharp blade, cut out a square or rectangle very slightly smaller than the size of the picture. Fasten the picture

lightly, with just a dab of glue, to a similar shaped piece of cardboard placed behind, so that it is visible through the square, then bind the two to the glass with the passe-partout.

Slides can be looked at through a daylight viewer, an illuminated viewer, or by projecting them on to a screen.

How can you view slides?

A daylight viewer is a very simple enlarger. The slide is placed in it, and the viewer held up to the light. The illuminated viewer is very similar, but has a battery and bulb inside to provide the light. A good table-top viewer can be bought for less than £2.

Projectors, naturally, are a lot more expensive, but well worth having as a Christmas or birthday present if you have taken up slide photography seriously. Projectors which will give a good picture in a small living room are reasonable in price, because unlike projectors for large rooms they use quite small lamps which do not have to be cooled by an electric fan.

Even the smallest screen with a good surface costs several pounds, and you can save money on this by going to a shop which sells screen material by the yard. Buy a square, and frame it with black paper, then fasten a wooden rod at the top and bottom so that it will hang evenly.

Are screens expensive?

You may be offered screen material with a beaded surface as well as

ordinary white screen material. If you will be showing your pictures in a long narrow room, choose the beaded screen, because this gives the brightest and clearest picture for those sitting nearly in line with the beam from the projector. In a square room, with people sitting a long way to the side, a plain screen gives better results.

If you have a tape recorder, you can record what you want to say about each picture, and then, after each announcement, place a length of white marker on the shiny side of the tape.

How do you add a commentary to your slides?

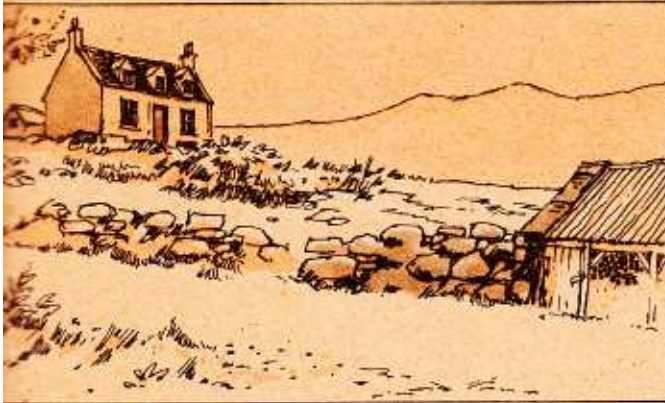
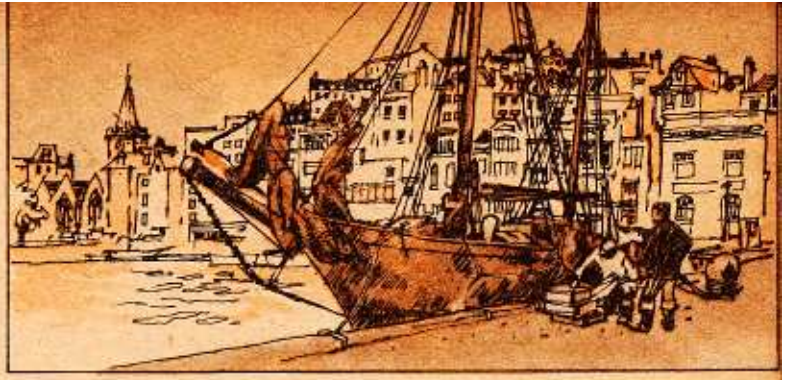
record what you want to say about each picture, and then, after each

With the tape recorder beside the projector, you will be able to see the white marker, which is the cue to change to the next slide in readiness for the next announcement.

The same rule applies to commentaries as to titles in an album—your announcements should say something which *adds* to the picture. Instead of, 'HERE ARE SOME PEOPLE FISHING', what about, 'MANY SPANISH FISHERMEN GO OUT AT DAWN AND DON'T GET HOME UNTIL SUNSET. THESE ONES WERE LUCKY—THEY'D CAUGHT TWELVE LOBSTERS.'

Many enjoyable hours can be spent with your family and friends showing the slides you have taken.





The top two photographs show that a foreground object to give perspective makes a scenery photograph more interesting. The bottom two photographs show that a landscape with people or animals is nearly always more effective than one without them.

Choosing Your Subjects

You may have heard the expression, 'The camera does not lie.' This itself is a lie, because often an interesting scene makes a dull photograph, and something which looks dreary in reality can be made exciting when turned into a picture.

What makes a good landscape picture?

Here are a few useful tips worth remembering:

(a) Distant scenery seldom looks interesting unless the picture also includes a foreground object to give it perspective.

(b) Distant objects which look quite large to the naked eye will often be almost invisible in a small print.

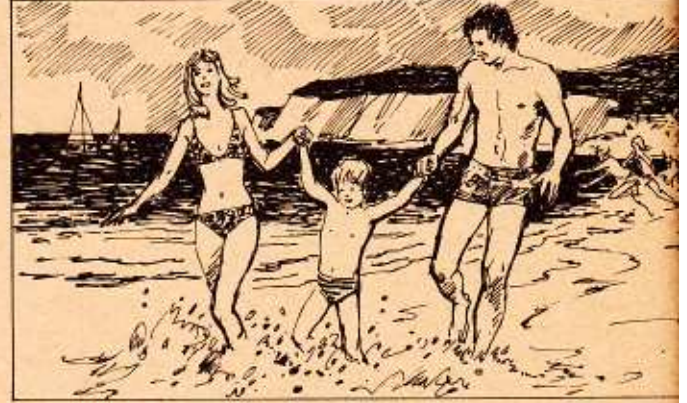
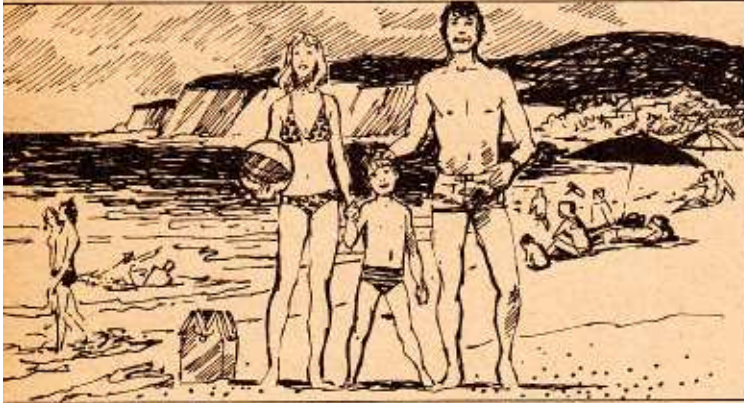
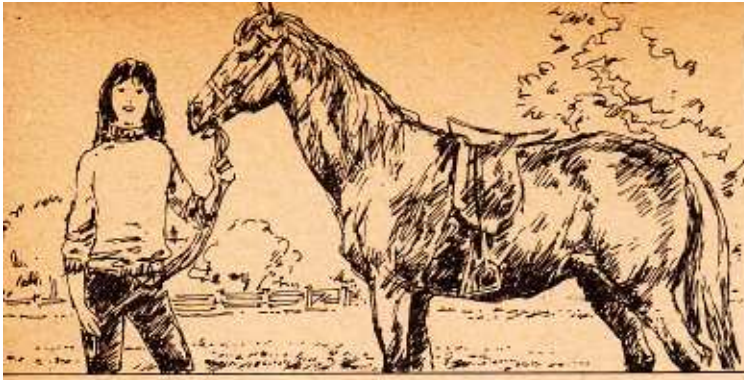
(c) A landscape with people or animals is nearly always more effective than one without them.

(d) The camera tends to make distant objects—particularly in the mountains or at the sea—look hazier than they really are. This can be cured by placing a haze filter over the lens.

Apart from deliberately staged portraits, people nearly always look best when

What are the best pictures of people?

they are doing something. If you are taking a picture of somebody in the garden, instinctively they will stand upright, facing the camera, and smile. A much more interesting picture would result if they were seen weeding, pouring out tea, cleaning a bicycle, or digging a flowerbed. On the beach, too, the picture has more life to it if people are seen to be doing something.



The two photographs on the right illustrate that action shots are more interesting than 'posed' photographs.

Babies cannot, obviously, be told to do something specially for the camera. But when they have

How do you photograph babies and animals?

reached the crawling or walking stage, wait for a bright sunny day on which you will not have to make constant adjustments to the focus to allow for changes of distance, and then squat a few feet away from where the baby is playing. Pretend to be using the camera for a few minutes, until the baby loses interest, and then simply wait, with your eye to the viewfinder and your finger on the trigger, for a moment when the baby's expression and actions are worth taking.

You will find that this is also the best way to take pictures of family pets, such as guinea pigs or rabbits.

But dogs and cats usually walk or run towards you as soon as you squat, so if you have already done your calculations about the light and distance, you may catch a good picture as they approach.



To get a good photograph of a baby, you will need to wait until the baby has lost interest in the camera and is behaving naturally.

People at parties become self-conscious when they see a camera. They turn

Are party pictures difficult?

towards it and smile—and immediately turn into people posing, instead of people enjoying themselves. Use the same method as with photographing a baby—pretend to take pictures for a while, until everybody loses interest. Only then do you start pressing the trigger!

This is fine for parties out of doors. But indoors, using flash, it is often best to wait for a moment when everybody's attention is drawn to one corner of the room. The flash will make them turn towards the camera—but too late to spoil your picture.



The most successful party photographs are taken when no-one is taking any notice of the photographer!



Some of the best football pictures are taken from one side of the goalmouth.

Team games such as football or hockey are best taken from well above ground level,

How do you take sports pictures?

otherwise it is very difficult to see what is going on, because the players in the foreground blot out those behind them. Unless you have a special lens on your camera, take your pictures only when the action is close to your side of the field. Many of the best football pictures are taken from one side of the goalmouth when there is plenty of action in the penalty area.

Satisfactory cricket pictures are almost impossible without a 'telephoto' lens, which has the same effect as a telescope, because of the distances involved. At a minor game it may be possible to go out onto the field for a moment to get a close shot, but at major games it is better to take pictures of players during net practice.



Photography can greatly enlarge the enjoyment you can get from other hobbies.

Golf pictures are not difficult, but because of the speed of a stroke, a very brief exposure is essential to avoid blurring.

Tennis is best shot from a high vantage point, and so is any sport involving horses. Motor racing should be shot as nearly as possible to 'head-on', otherwise blurring is almost inevitable. A good position to work from is the completion of a bend in the course, when the speed of the cars has been reduced.

Your camera can be put to many uses.

How useful is photography for other hobbies?

If it has a lens suitable for taking close-up pictures, you can make prints or slides of stamps, coins, medals, models, and other things which people collect. It can add a great deal to the interest of train spotting and similar hobbies.

Many people who build and collect model railways or aircraft, and particularly the thousands who in recent years have taken up the hobby of 'War Games', using miniature soldiers and guns, find that photographing the completed scenes is one of the biggest interests. Many exchange their pictures with collectors in other areas and even other countries.

The problem of whether to take prints or slides can be overcome to a certain extent by using an epidiastroscope. This is a special projector which by means of lenses and mirrors will show a photographic print—or any small object—on a screen. But the quality is *not* as good as that of a projected slide, and the picture size has to be much smaller.

Many people have taken up the hobby

What is comparison photography?

of recording local history with their cameras. This is

done by 'comparison photography'. The first step is to borrow as many old photographs and postcards of the district as you can find, and re-photograph them. For this the camera is placed on a tripod, and the photographs held in place on a board by means of clips or pins. A camera which can take close-up pictures is, of course, essential, but you do not need to work with artificial lighting indoors. Choose a bright day out of doors, setting up the tripod and the pictures in a way which will avoid shadows or reflections.

When you have taken these photographs and returned the originals, the



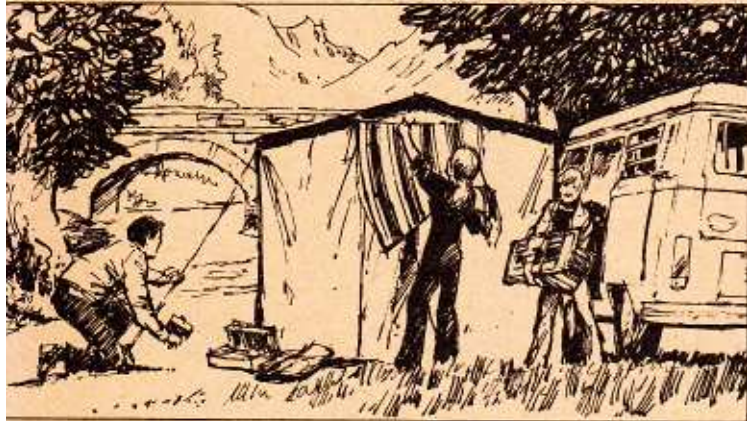
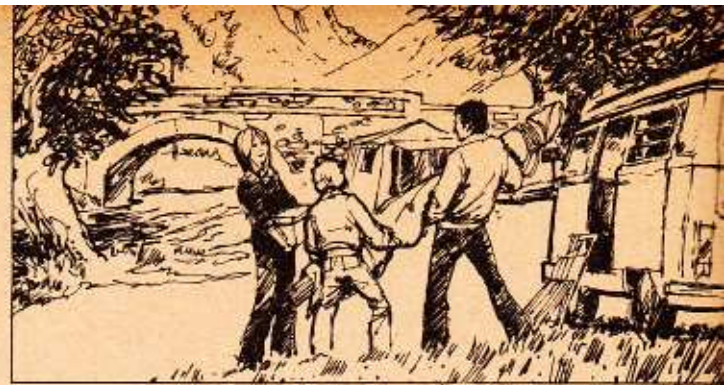
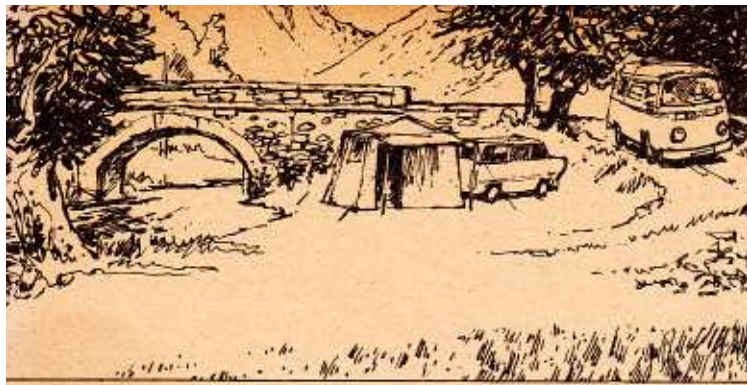
These two photographs are of the same place—but taken many years apart. Can you spot what has remained unchanged?

challenge is to find the same places and take shots of them as they are today. What was once a narrow lane with horses and carts may now have become a dual carriageway, with only one or two buildings or trees of recognisable shapes to provide identification. Take your re-photographed pictures with you when you go out on your expeditions, so that as far as possible you can shoot the new pictures from the same angles and distances.

There are many subjects for modern

comparison picture collections, too. Over a period of a few years, photographs of all the different cars owned by various members of the family will show how cars are constantly changing in shape and style.

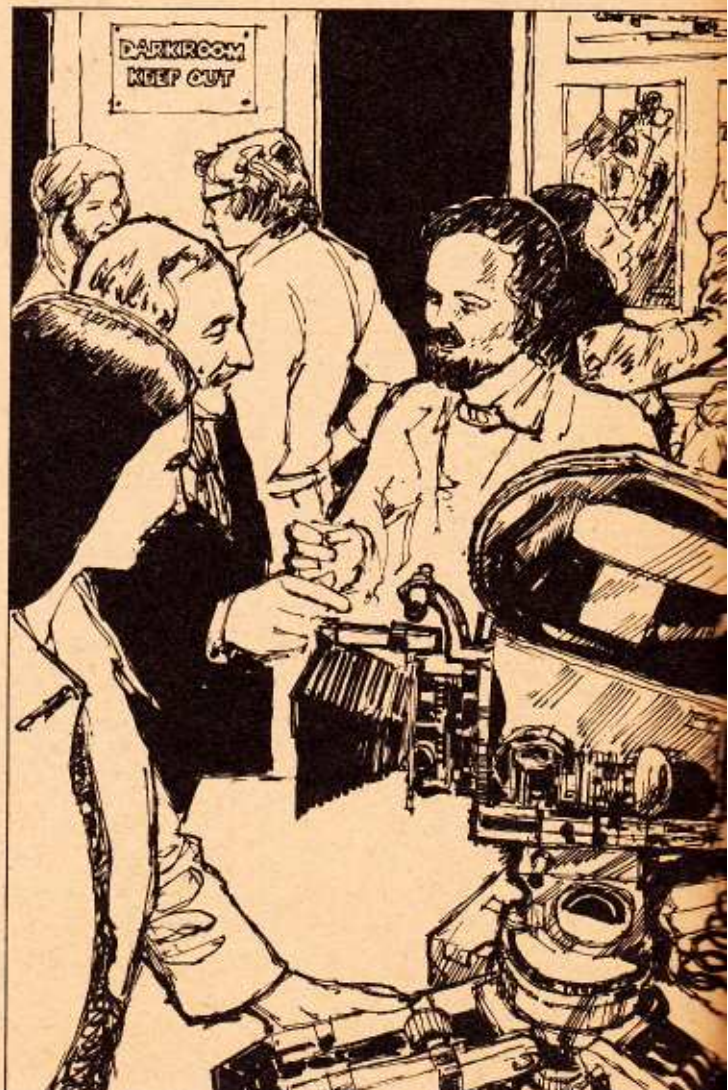
When out and about on holiday you can build up several different collections at the same time—a comparison collection, perhaps, coupled with collections such as colourful and amusing inn signs, top footballers, or other people's pets.



A series of 'progression' pictures.

If you can find a position from which it is possible to take pictures at regular intervals of some major work in progress, you can get some fascinating results. For example, if a new building is being put up, a series of pictures taken once a week for several months, always from exactly the same position, will show how the work is done. The building of a bridge is an even more interesting example.

Or at home, if there is a baby in the family, take a birthday picture each year in exactly the same setting and position. Seen side by side, these photographs will be a fascinating record of the baby's growth. Other progression pictures can show changes in the garden or in the house.



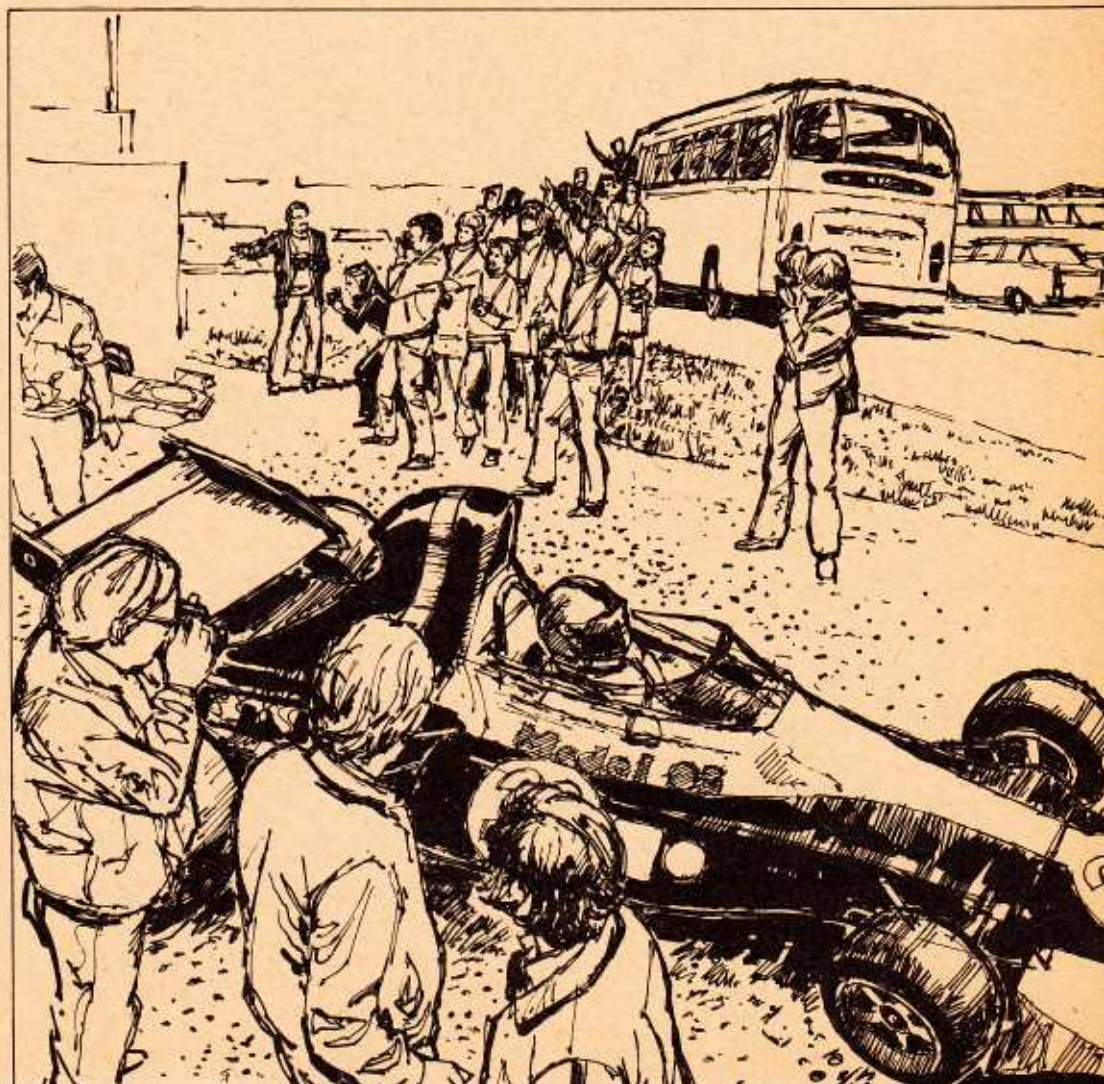
Though a lot about photography can be learned from books, just as much comes from meeting and talking to other enthusiasts. In all but the very smallest towns you will find there is a camera club. If the name and address is not listed in the town guide-book, you will certainly be able to find out about it at the library or the town hall. Many of these clubs have junior sections, for which members still at school pay a reduced subscription.

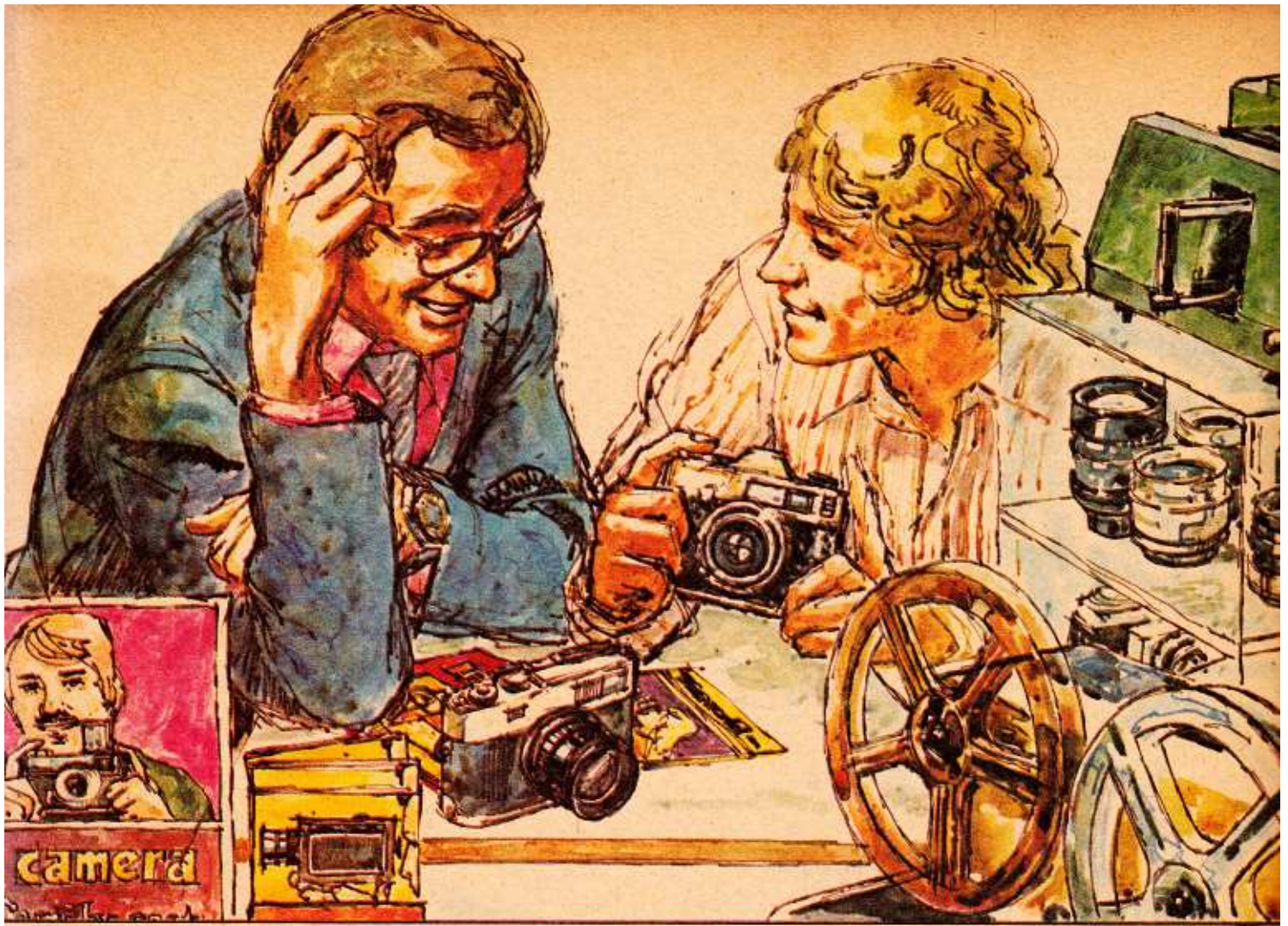
Where can you meet other photographers?

Camera clubs organise special outings to places of photographic interest. They have regular meetings at

which members can exchange ideas and advice, they hold competitions so that you can judge the standard of your pictures against those taken by other people, and they often own items of special equipment which members can borrow. Many of them have their own darkrooms—a very important point if you have no darkroom at home. Sometimes the local photographic dealer is a member, and makes special price reductions on cameras and films to those in the club.

Camera clubs enable you to meet other enthusiasts and exchange ideas. They often have equipment that you can borrow, and arrange outings to places of photographic interest.





If you are interested in cameras, why don't you make a career out of selling them and photographic equipment.

Photography as a Career

There are many good jobs in professional photography. These range from the simple one of working in a camera shop and taking passport pictures for customers, to becoming a top Press photographer 'covering' wars, Arctic expeditions, and the Cup Final.

The simplest jobs can be 'learned by doing'—while at the same time going to evening classes to fill in the gaps in what you will already have picked up

as an amateur photographer. Working in a camera shop naturally involves more than just selling cameras and films; customers ask plenty of difficult questions, and expect to get helpful answers. They want advice about which cameras and films are best for particular jobs, how various gadgets work, and which cameras are the best value for money. A camera shop assistant who knows the answers has a very good chance of becoming a manager later on, or even having his own shop.

Using rather than selling cameras also

**What does a Press
photographer need
to know?**

needs proper training, because employers such as newspapers or business firms cannot simply rely on your claim that you are a skilled photographer; they need to see some qualifications on paper. There are various kinds of courses provided by colleges of further education and through evening classes, at which you can learn about Press photography and industrial photography. Both can provide you with interesting and well-paid careers.

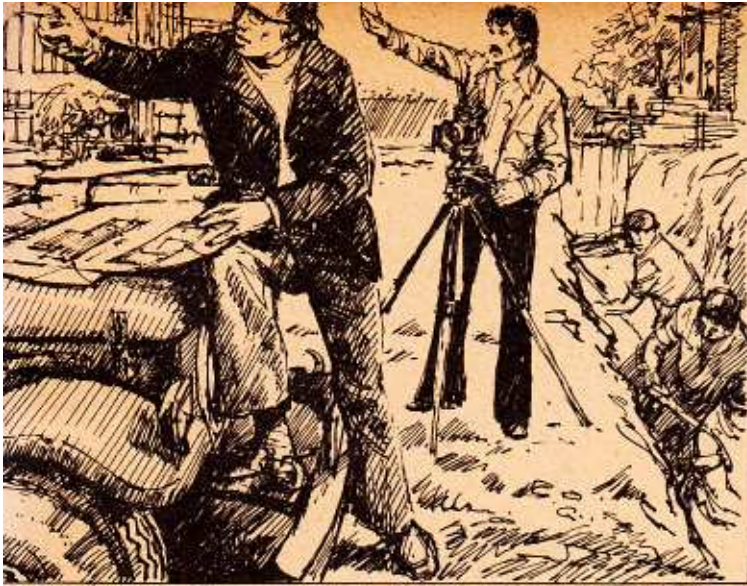
A Press photographer's main qualifications are speed and accuracy. His success depends upon catching events

at their best moments—the bride throwing her bouquet to a bridesmaid, the scorer as he drives the ball into the net, and the champagne bottle as it is flung against the bows of the newly-launched ship. There is no second chance with any of these, and so the Press photographer has to be completely confident about his ability to size up light, focus, and picture composition accurately in a split second.

The best way to find out about a career in Press photography is to talk to one of the photographers of your local paper. He will know what opportunities there are likely to be in your neighbourhood. The local education office will be able to tell you about training courses.



A Press photographer has to rely on his speed and accuracy. He very rarely is able to get a second chance at a shot.



Another career in photography is working alongside architects while construction work is going on.

The job of an industrial photographer is to help take the many thousands of photographs used by industry to advertise products, demonstrate methods of manufacture, and instruct people how to operate machinery. An expert will specialise in one particular branch, such as fashion photography, display advertising, technical design, etc. He needs to know a lot about his chosen subject, and also about how to take pictures under difficult conditions.

As well as this, he has to spend time studying printing methods, so that he can judge exactly what is needed to suit the page plans and layout of magazines and technical books.

Though many small camera shops and chemists develop and print films in a darkroom on the premises, the more complicated work, and the processing of slides and movie films, is nearly always done at laboratories run

Are there interesting jobs in film processing?

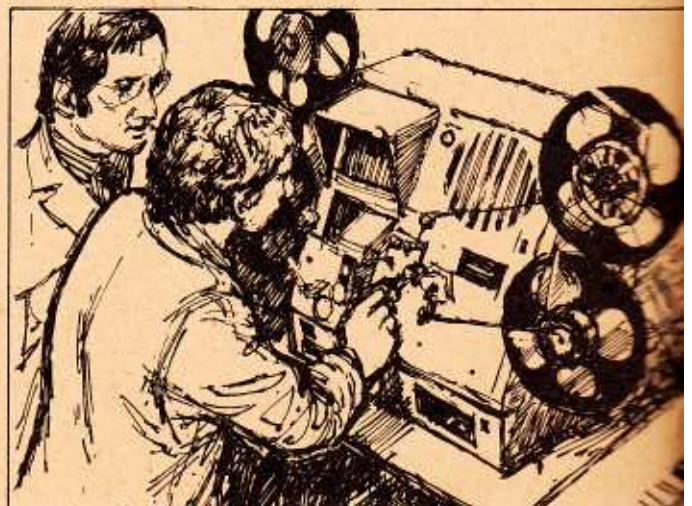
chemists develop and print films in a darkroom on the premises, the

by big firms. Some of the work in these laboratories is much the same as in any other factory. It does not need somebody keen on photography to prepare packages for the post, or keep an eye on a machine. But as well as these simple jobs, the laboratories have plenty of opportunities for people with the right training, in doing special processing and experimental work.

Progress in photography is going on all the time. New designs of cameras and slide projectors, new

kinds of film and methods of processing, follow on each other faster today than before, and the big firms which lead the way give very good opportunities to young photographic scientists to prove their ability. But to know enough to play a useful part in future research and invention, you need a good science degree from a university. The road to becoming a photographic scientist is not an easy one, but for any boy or girl keen and skilled enough, it is a fascinating and rewarding career.

There are many interesting jobs in film processing, especially in laboratories doing experimental work.





Friese-Greene is usually given credit for the invention of cinematography. He filmed riders in Hyde Park in 1889, taking the photographs very quickly by turning a handle on the side of the camera.

Using a Cine-Camera

Once chemists had found out how to make a 'fast' photographic emulsion, it was only a short step to the invention of cinematography. The man usually given credit for this is William Friese-Greene, who took pictures in London's Hyde Park in November 1889.

The cine-camera works on a very simple principle of optics. If the human eye is shown in one second a dozen or more 'still' photographs of the various stages of a movement, it sees these stages as one continuous action. To understand this, it may help to draw a series of little 'stick men' on the marginal corners of an old unwanted book. If in a dozen drawings you make the stick man raise his arm by stages, then when you flip the pages the

movement will appear continuous.

In a cine-camera, a long strip of film on a spool is moved forward by the motor and by a claw which fits into the perforations down its side. One 'frame' (or picture area) is brought into the 'gate' by the claw, and halted there, in the same position as a frame of film ready for use in an ordinary camera. The motor then opens the shutter, an exposure is taken, the shutter closes, and the motor and claw move the film on, putting another frame into the gate for the same process to be repeated. After the film has been processed it is shown by the same method—each frame being halted in the gate of the projector while the shutter is opened to let the light shine through it on to the screen.

Films made for showing in the cinemas

What are the sizes of cine film?

are shot on film 35mm wide, or even 70mm, because to obtain a picture big enough for a huge screen, there must be a large picture on the film itself. Most television films are shot on 16mm film. Amateur film makers usually use film 8mm in width, for this, shown on a good projector, can be made large enough on the screen for audiences of up to about a hundred people.

If you go to a photographic shop to

What are Standard 8 and Super 8?

buy a cine-camera, you will almost certainly be offered one which uses Super 8 film, which has replaced Standard 8 in the last ten years. By reducing the size of the perforations into which the claw fits, Super 8 film has a slightly bigger frame area than Standard 8. This means that if two films shot on the two gauges in the same conditions are shown side by side on screens of the same size, the Super 8 picture will have been magnified slightly less, and will therefore have slightly sharper definition.

Secondhand Standard 8 cameras and projectors can be bought very cheaply, and as many thousands of Standard 8 cameras are in use, there is no danger that supplies of film will go off the market.

Many projectors (but not cameras) are

What is 'dual gauge'?

made so that by a simple adaptation they can be



used to show both Standard and Super 8 films—because many thousands of people who now use Super 8 still have the films they previously made in the old gauge. Dual gauge projectors are naturally rather more expensive.

There are many methods of adding

How can sound be added to a film?

sound to an amateur film, most of them using mechanical or electrical links to run a tape recorder and the projector at the same speed. But the modern method is known as magnetic stripe—a narrow strip of recording tape attached to the film just beyond the edge of the picture area. This travels through a sound head similar to that of a tape recorder, which can be used to record or play back through a loudspeaker. While projecting the film, a commentary, music, and sound effects can be added, and the magnetic stripe will retain these.



A conversation between two people on the screen can also be recorded while the film is projected, by miming to the lip movements, but this is not very satisfactory, because the slightest mistake in the timing is very noticeable. For accurate lip-synchronisation, a special camera is needed which will record the conversation during the actual filming.

Taking a cine film is totally different to taking still photographs. A few useful rules

How is a cine-camera used?

are:

- (1) In movie-making it is the objects in the picture which should move, not the camera. The camera should normally not be moved, except to follow a moving object.
- (2) Movie-films are not made up of one continuous shot, but of dozens, examining a subject from different distances and angles. Most shots of

Left—Steady positions for using a camera: tripod; fence; elbows steadied on a window frame; lying down with elbows on the ground.

Right—a short 'storyboard' of successive pictures of a man being chased using different angles and distances to get maximum effect very simply.

under two seconds in length do not leave any impression on the audience unless they are part of a rapid sequence all related to one subject. For example, a shot of the villain tottering at the cliff edge can be followed by merely two seconds showing his fall, and the audience will understand the sequence. But a two second shot of a rose in bloom, followed by two similar ones of dahlias and chrysanthemums, will leave the audience puzzled, and so would a succession of two second close-ups of different people.

- (3) A cine-camera has to be kept steady throughout the shot, which may last for as much as ten seconds, otherwise on the screen the picture will jerk all over the place. Try whenever possible to use a tripod, or rest the camera on a wall or other fixed object during filming.

Movies *can* be shot just as they will be shown, but usually for one reason or another

How are movies put together?

the shots have to be taken out of order. In a film which has alternate shots of Red Indians attacking the old ranch-house and the United States cavalry galloping to the rescue, the Hollywood director does not race backwards and forwards with his camera between the two scenes. He shoots a roll of film of the Indians, then another of the cavalry. After the film has been processed, he joins a bit of the attack to a bit of the cavalry, and then another bit of the attack—making the shots shorter and shorter each time to increase the excitement.

The joining is done with a splicer, which holds the two ends of film together in the correct position. One end slightly overlaps the other. The film emulsion is scraped off this overlapping section, and then after coating it lightly with film cement, pressure is applied by the splicer until the overlapping sections are tightly joined.

Another way of joining film is by tape joins, using special pieces of sticky tape. These are easier to use, but generally more visible on the screen as they go through the projector.

The whole of movie-making depends on clever cheating. If, for example, you took a shot of someone walking across your living room, and going out of the door, then

How do movie-makers cheat to tell their stories?

on clever cheating. If, for example, you took a shot of some-



The 'vertical' climb—just one way of cheating with the camera!

followed it by the same person appearing from the doorway of a castle, the audience would take it that your living room was inside the castle! Or if on a day with cloudless sky you film somebody clawing his way desperately across some rough rocks, and *do the filming with the camera tilted ninety degrees*, when the film is projected, he will be seen trying to climb up a vertical cliff!

With the camera rigid on a tripod, film somebody walking into the picture. Stop the camera, and without moving it, tell them to move out of the picture. Then film a little more of the same shot. On the screen, the person will walk into the picture, and then vanish!

Run the film *faster* than the normal speed through the camera, and when you project it at normal speed, you will have slow motion. Take a shot with the film going through the camera at *less than normal* speed, and a car travelling



cautiously down a winding mountain road can be shown on the screen as if it was racing down at a breakneck pace!

By tricks of the same kind, battleships six inches long can be made to fight the Battle of Jutland, and armies of only twenty men can be disguised as a thousand. In the naval battle, the movements of the models, which are far too fast, are disguised by filming at much more than normal speed. The small armies are multiplied in several ways. One is by rapid changes of shot—say five seconds of twenty men in steel helmets crouching behind a wall, three seconds of twenty men, some *without* steel helmets, firing from a trench, a few seconds of wounded men being carried away, then a few more of the twenty men running. The second way is to show feet running through a muddy ditch, in close up. The runners go round in a circle *behind* the camera, which therefore films a continuous



Filming the titles—on the screen the words will build up gradually as if by magic!

procession of feet for as long as it is needed!

When making the titles of a film, put the first letter in place, shoot a few frames, stop the camera, and add another letter, shoot again, then add another, until the title is complete. On the screen, the words will build up gradually as if by magic!

Sound can often be used to get over a problem you cannot solve in pictures. Here is a short film script to demonstrate this:

How can sound help the cheating?

1. A long shot of a hill, on which a man can be seen sitting.
2. A close-up shot of the man, eating his lunch. The sound of an approaching aeroplane can be heard.
3. Big close-up of the man's head and shoulders. He looks upwards uneasily. The aeroplane sound changes, to the noise of a steep dive.





One camera films the attacking Indians, while another camera films the cavalry. When both films have been processed, a bit of the 'Indians' film is joined to a bit of the 'cavalry' film, then another bit of the 'Indians' film to another bit of 'cavalry' film, and so on until your scene is completed.



A short 'storyboard' sequence to illustrate how sound can help the cheating. All that is needed is the taped sound of an aeroplane and machine-gun fire.

4. The man scrambles to his feet, starts to pick up his lunch box, then abandons it and begins to run. Above the sound of the dive, there is the chatter of machine-gun fire.

5. Long shot of the man running down the hill, zigzagging from side to side. Machine-gun chatter almost continuous.

6. Close-up shot of the man. He halts suddenly, flings up his arms, and falls. The machine gun dies away, and so does the sound of the aeroplane.

The audience watching this never see the aeroplane—but they know it was there! Almost every sound you are likely to need in making your own movies can be bought on tapes or records.

To make a cartoon film, you must have a cine-camera which can shoot single frames.

How are cartoons filmed?

Most modern 8mm cameras are designed to do this.

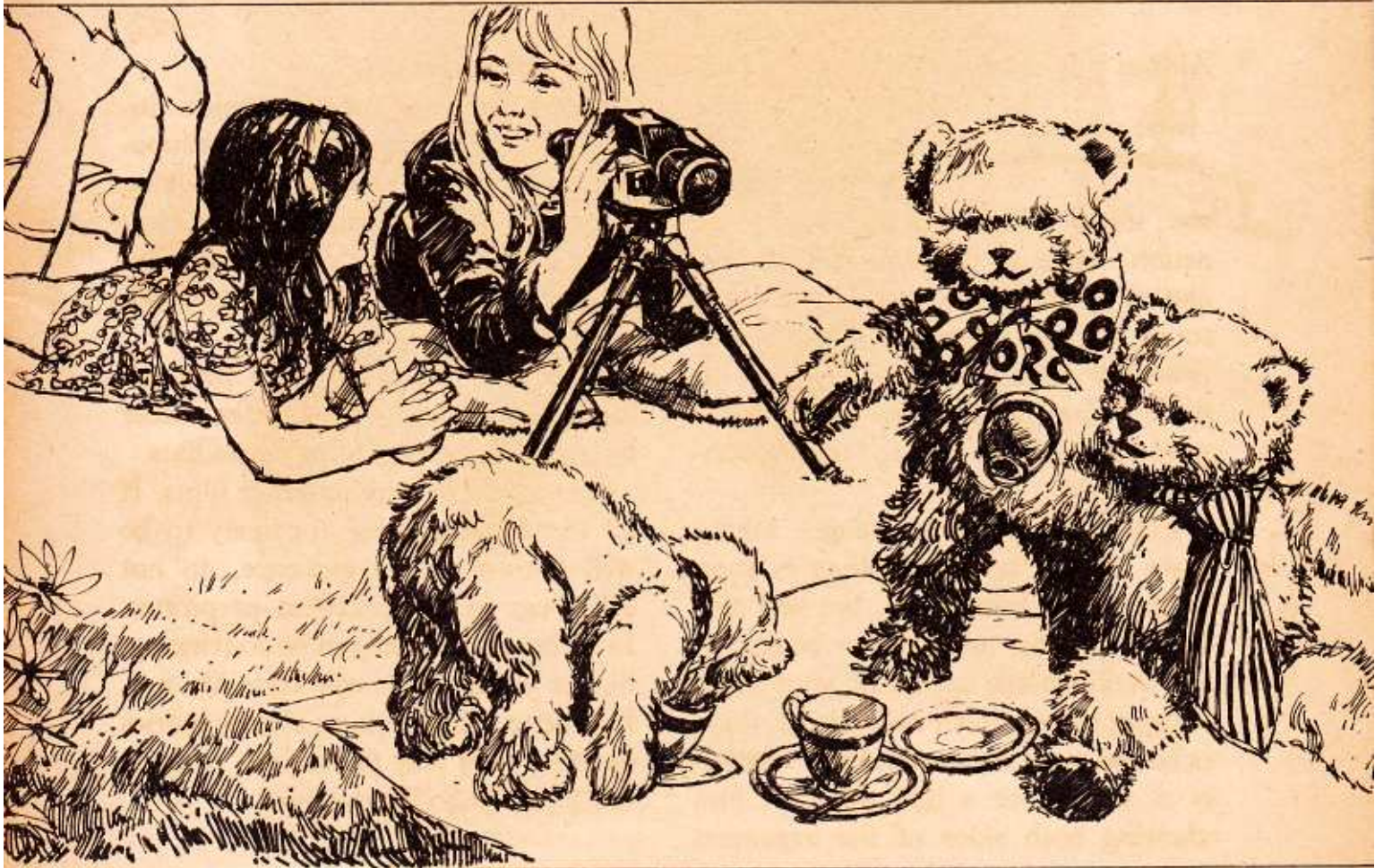
The simplest cartoon is actually not drawn at all, but is made by using puppets. An easy example can be made by fastening thin wire stands, like snow shoes, to the feet of a doll or teddy bear, and then making it walk across the lawn while single frames of film are exposed. The normal projection speed for 8mm film is either 16 or 18 frames per second. If you decide that each step forward is to take half a second, then you will have to expose 8 or 9 single frames while the step is taking place.

It is slow work. With the camera on its tripod, take two frames of the doll in its starting position. Move a leg forward a quarter of a step, return to the camera, and take two more frames. Repeat until the step is completed, then do the same for the other leg. On the screen, the walking action will be quite smooth.

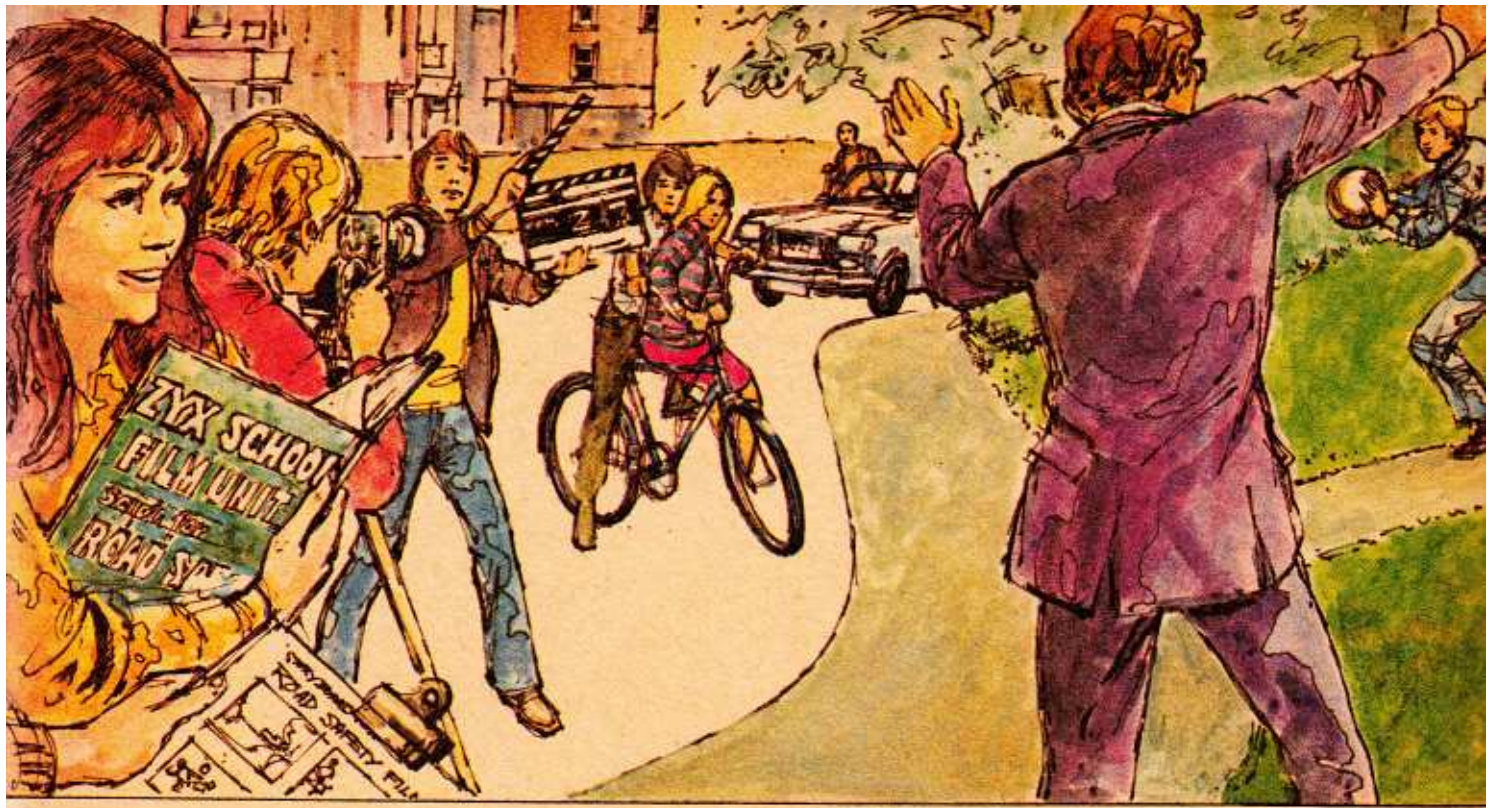
The simplest *drawn* cartoon is made by using a thick pad of tracing paper, and a black pencil soft enough not to dent the paper, and which can be rubbed out easily. Working from the bottom of the pad, draw the figure and then turn down the next page. You will be able to draw over the lines of

the first picture accurately on this second page, changing only what needs to be changed, such as the leg or arm positions, or the expression on the face. When you have worked right through the pad, put a spring clip at the top to keep the pages from shifting about, and film them frame by frame, using a sheet of plain white paper or card as a background each time, to prevent the drawing on the previous page showing through.

The pictures can then be rubbed out, and the pad used again. Colour cartoons for the cinema and television are much more complicated than this, of course, but the method is the same.



Animated films are slow work, but if you have the patience, the results are well worth the effort.



A film school unit making a road safety film.

Almost any subject can be made into a movie, but the easiest—and usually the best—are those which include plenty of action. 'How to do' films will always appeal to audiences, ranging from how to get a football team fit and properly trained for the new season to how to build flying models, how to lay out a model railway, or how to climb mountains safely.

Films which show changes taking place are not only interesting as soon as they have been made, but will also be in demand in years to come. If, for example, the centre of your town is being ripped down and rebuilt, there is bound to be argument about whether it is a good or a bad thing. A film showing both sides of the argument

is a good challenge.

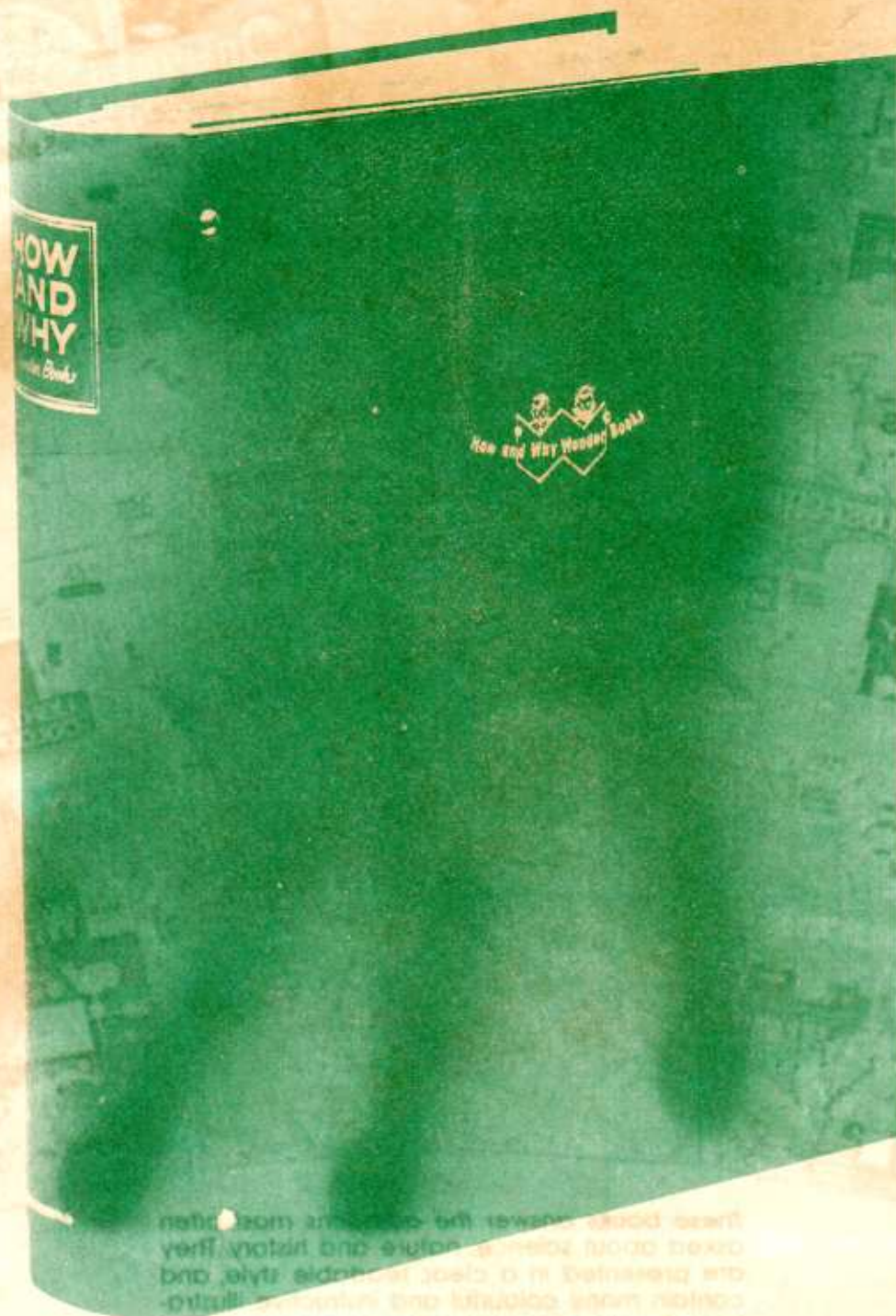
Films showing other people's interesting lives—their unusual occupations, their successes in overcoming handicaps, or their triumphs in achieving something against all the odds, are equally likely to be popular with audiences.

And then there are very personal films, to show why *you* prefer soccer to rugby, or houses to high-rise flats.

Be careful in making story films. If all those taking part are likely to be well known to the audience, do not ask them to be spacemen or pirates. In a play they might just be convincing, but in a film they will certainly not. It is better, therefore, to choose stories in which they play themselves, or parts fairly similar to themselves.

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